Gardens Oval 1 Lighting Proposal

Consultation Report

Prepared by True North Strategic Communication for AFLNT and NT Cricket

September 2017

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Executive summary

True North Strategic Communication was engaged by City of Darwin on behalf of AFLNT and NT Cricket to consult with key stakeholders, residents and the wider community on their proposal to install lighting at Gardens Oval 1.

The lighting is needed so the oval can be used for training and occasional games in the evening as current sporting ovals across Darwin are at capacity. The key use is expected to be for the women's and junior competitions.

The general approach to consultation was to identify all affected stakeholders, paying particular attention to people living closest to Gardens Oval. This included letterboxing 685 units on streets surrounding the oval, sending letters to all property owners, contacting body corporates, personally contacting as many people as possible, messages on social media and media coverage. It also involved emailing around 50 stakeholders who were identified as likely to have an interest in the proposal.

The second task was to ensure all affected residents and stakeholders had access to accurate information so they could understand the implications of the proposal, clarify issues of concern, ask questions and express their views. This was done by providing a technical report and fact sheet with a visualisation of the effects, personally talking to and meeting with as many people as possible and holding a public meeting where experts showed a sample of the proposed lights and the results of their modelling.

The third task was to capture the range of views, the values of people living nearby and reasons why people supported or opposed the proposal.

In all, around **100 people** were spoken to and **392 people** completed the online survey. Of those who were surveyed**, 94% supported** the installation of lights at Gardens Oval 1. Of the 18 written submissions received, **13 were objections** (12 from nearby residents and one from the Planning Action Network (PLAN)).

Key findings of the consultation

Summary

A high-level summary of the consultation findings is provided below:

Support for lighting Gardens Oval 1:

- there was a high level of support for the proposal and little opposition to its intent, namely to provide female and junior teams with an alternative training venue;
- most people (94%) surveyed were supportive of the lights;
- those who were supportive could be characterised as people who would benefit from the lights, in particular the Waratah Cricket Club, Waratah Football Club and other sporting groups that would use the facility;
- supporters could also be characterised as Darwin families whose children play sport;
- a high percentage of the supporters of the lights are individuals and families who use Gardens Oval often (more than once a week);
- there was strong sentiment around the need for another lit oval in Darwin to offer a cooler and safer place for women and children to play sport given the hot and humid Darwin climate and the incidence of heat-related illness in sport;
- the majority of supporters felt that installing lights at Gardens Oval was long overdue, and felt that it is necessary to support the growth of sport in the Territory; and
- supporters felt the hours of operation were reasonable and unlikely to be fully used. They were confident that clubs could regulate the use of lights in accordance with conditions and said most users would be junior teams who were unlikely to add to anti-social behaviour in the area.

Opposition to lighting Gardens Oval 1:

- there was strong opposition from a concentrated group of Gardens residents and from PLAN;
- the opponents could be characterised as long-term Darwin residents living in highrise units that look over the oval, who value their lifestyle, enjoy the green outlook from their units and fear impacts on their amenity from the lights;
- the majority of the opponents indicated that they used Gardens Oval rarely (once or twice a year) but look over / view it daily;
- the reasons for strong opposition include:
  - distrust of the information provided about the impact of the lights;
  - concern because of their previous experience with lights from the golf course, which they were told would not impact their amenity, yet many feel they have suffered significant impacts, which compounded their mistrust of the latest proposal (legacy issue unrelated to current proposal);
  - a perception that nothing has been done to address these concerns;
  - concerns not just at the lights but the height of the towers;
  - general concerns about changes to amenity of the area, such as rubbish, noise and late-night antisocial behaviour and fears that this may be compounded with greater evening use of Gardens Oval, affecting not just residents but wildlife;
  - a general cynicism towards any consultation by government and council on planning issues and whether consultation has any influence on decisions; and
  - some queries about whether this was money well-spent and why the lights couldn't be installed at another oval.

Although there were differences of opinion on the proposal, what most people shared was support for women's and junior sport. Most agreed that lit sporting facilities made sense in Darwin to allow sport to be played in the evening, which is a safer and more enjoyable option to playing in the heat and humidity of the day-time.

Supporters

Supporters make up the majority of respondants of this consultation, with most choosing to provide their support via the survey. A high percentage of the supporters of the lights are individuals and families who use Gardens Oval often (more than once a week) and include the broader community and individuals and organisations engaged in sport and other lifestyle activities.

For these people, the precinct offers a central recreational space near the CBD which they feel they have a right to enjoy. Not surprisingly, they were overwhelmingly supportive of lights being installed at Gardens Oval 1. This came through strongly in the survey responses with a high number indicating they were NTFL or cricket players or spectators.

Some supporters argued that residents' objections were nimbyism (Not In My Backyard). Others felt that it is unrealistic for residents to expect a secluded lifestyle on the fringe of a city.

Opponents

Opponents make up a small percentage of respondants of this consultation, however their concerns were captured more intensely through written submissions. The majority of the opponents indicated that they used Gardens Oval rarely (once or twice a year) but looked over it daily.

The most opposed were people whose units look directly across the oval and its surrounds, in particular those living along Warrego Court, Houston Street, at the Larrakeyah end of Smith Street and Buffalo Court. PLAN also submitted an objection to the proposal.

The residents were quite polarised on the proposal largely based on whether they were likely to be beneficiaries, or perceived the project as impacting on their lifestyle and peaceful enjoyment of their surrounds. They see the proposal as the 'thin edge of the wedge' and expressed concern at the incremental

incursion of public events and activities in the area, including night markets and concerts. They associated this intrusion with rubbish, noise, cars hooning and drunks frequenting the area.

A key part of opponents' concern was distrust of government and council to regulate use of the lights, should they be approved. Worth noting is that opponents of the lights developed their own advertisement, which appeared in local media three times during the consultation, focussing primarily on the height of the proposed towers and the impact on people and animals. This demonstrates the opponents level of concern about the proposal.


ADVERTISEMENT

OPEN LETTER TO THE COMMUNITY

From the birds & creatures –
where should we move to??

We, the residents of the vicinity of Gardens Oval, love our homes, we love our community, we love our views and we love our life styles.
We appreciate that people love their sports and we love that Darwin has great sporting activities for use all year around.
But ... We don't love the thought of four, 32m Lighting Towers that are proposed for Gardens Oval that will be used 50x nights a week to 9pm.
It's going to affect how we live and enjoy the peace and quiet of our homes.
We just don't think this particular proposal is suitable within this area, as it is surrounded by high-rise, high-density residential homes.
Most of the users of these facilities will get to go home afterwards, but night after night we will have the lights blaring away.
The Waratah Sports Club will benefit from this proposal for use with night Cricket and AFL, but in this instance we just don't think it's the right location.

Our Key Concerns

- **Light Pollution...**
- **Ongoing costs if the sporting club goes bust again...**
- **Environmental effects as it is with in the Botanical Gardens area...**

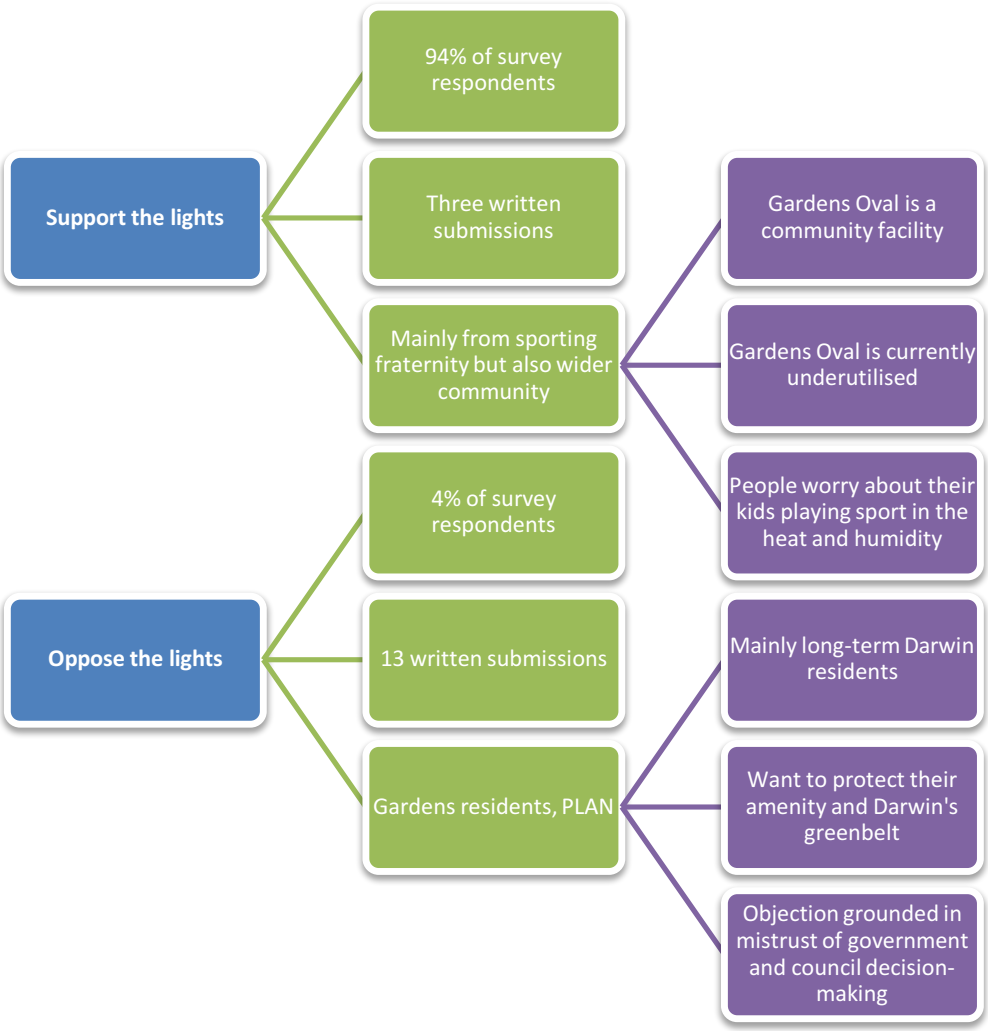
AUTHORISED by Harry Marchie, PO Box 39995, Winnellie 0821

^ NT News Ad, Saturday August 19, 2017

Some residents argued that it's easy for individuals and organisations engaged in sport and the wider community to support lights being installed at Gardens Oval 1 because they don't have to live with regular use of the lights at night.

Snapshot of findings from the consultation

A snapshot of the findings from the consultation is provided below.

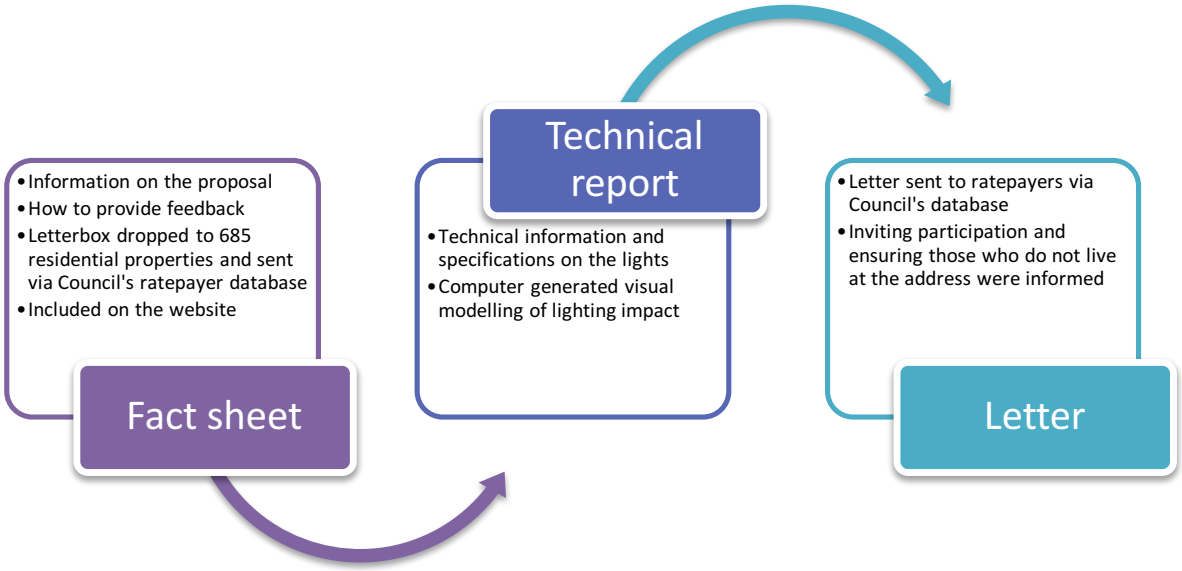


Consultation methodology

The consultation program ran for nine weeks from 13 June to 11 August 2017. The timeframe is two weeks longer than originally planned, and was extended due to the growing interest in the proposal in the last week of the original consultation period.

The consultation included a variety of communication material and methods to ensure people were aware of the consultation and able to contribute their views, and that input and feedback was balanced and representative of all stakeholders.

The **communication materials** included:



The **communication methods** included:

Next steps

This report has been prepared after a nine-week consultation process on the proposal by AFLNT and NT Cricket to install lights at Gardens Oval 1.

It is recommended that the next steps are:

- Council consider the consultation and report, including the feedback received by stakeholders, residents and the community, noting:
    - Support for the installation of lights at Gardens Oval 1 is high at 94% of survey respondants. The supporters are made up of individuals and organisations engaged in sport and other leisure activities, and families across Darwin who's kids play sport.
    - Thirteen (13) written objections were received, 12 from residents who live in the surrounding area and one from PLAN.
- Council release the report to the public on City of Darwin's website, and authorise True North Strategic Communication to provide a copy to those who made a submission or requested to be kept informed; and
- Council's decision on Gardens Oval 1 be communicated back to stakeholders, residents and the community, with reference to the information gathered during the consultation process and how this guided Council decision-making.

Background

Over the years, the Gardens precinct on the fringe of Darwin's CBD has evolved into a vibrant and diverse location. It offers multiple activities for the wider Darwin and Territory population and is the home of the George Brown Botanic Gardens, the Gardens Park Golf Links, Gardens Oval, Skycity Casino, the Amphitheatre and Mindil Beach. It is also the location of a number of popular events over the dry season including Mindil Beach Markets, BASSINTHEGRASS, Territory Day and Darwin Festival.

The area is also home to just over 700 residents who live in the highrise apartment buildings that sit around the Gardens escarpment. For many residents, the relaxed lifestyle and green outlook from their units was the appeal in moving there, and many fear the continued development of the area will intrude on their lifestyles. Some residents are angry about previous planning decisions in the area. A number of these residents are from long-term Darwin families who have a strong emotional and financial investment in their homes, with many paying premium prices for properties on the upper storeys with views of the gardens and the coastline.

City of Darwin has previously considered a proposal to install lighting on the Gardens Park Golf Links to allow night golf to be played (2014). This proposal was strongly opposed by nearby residents who were concerned about the intrusion of bright lights through their windows, impacts to amenity, noise and behaviour, environmental impacts, the consultation process and impacts on property values.

Although the City of Darwin resolved not to consent to the installation of lighting for night time golf, the proposal has had a lasting impact on some Gardens residents. One resident described the golf course trial light installed in 2014 as being so bright that he could 'do a puppet show on his bedroom wall'. Others describe lighting from other nearby venues (tennis club, Skycity and businesses along Stuart Highway) as unacceptable given that the light shines up and reflects into their units.

Aware of the sentiment of residents regarding lights in the area, City of Darwin requested that AFLNT and NT Cricket consult with key stakeholders and nearby residents on their proposal to install lights at Gardens Oval 1.

The proposal

The proposal by AFLNT and NT Cricket includes the installation of four light poles to achieve a maximum brightness of 600 lux in the centre of the oval. The steel poles would be 32 metres high. The recommended system utilises metal halide luminaires, each with a glare shield and rear visor to prevent unwanted light spill to surrounding areas. A control system would be installed near the clubhouse so the lights can be switched to the required lux level.

Lighting an existing oval like Gardens Oval increases field time and is considered a sensible solution to help grow both NTFL and cricket, sports that are experiencing unprecedented growth in the Territory. AFL and cricket are the two biggest sports in the Territory in terms of participation. AFL has seen growth to over 42,000 players across the Territory and more than 17,000 women players.

The lights will cost an estimated $1.2 million with funding for the project from the Northern Territory Government.

As the main users of the oval, AFLNT and NT Cricket have indicated the **maximum periods of use** as follow:

Day	Time	Lux Level
Monday	6-9pm	100 lux (training)
Tuesday	6-9pm	100 lux (training)
Wednesday	6-9pm	100 lux (training)
Thursday	6-9pm	100 lux (training)
Friday	6-9pm	600 lux (dry season cricket match)
Saturday	6-9pm	300 lux (wet season football game)
Sunday	Not in use	

A technical report was prepared to support the consultation and is provided in **Appendix 1**.

Drivers for the lights

AFLNT and NT Cricket see the lights at Gardens Oval 1 as an essential upgrade to support the growth of their sports. AFL has grown to over 42,000 players across the Territory and more than 17,000 women players. Darwin's current sport fields can't cater for this growth in a safe, responsible or functional way.

With funding from the Northern Territory Government, the lighting proposal is in accord with the objectives of City of Darwin's *Sports Field Plan 2016 – 2026* which says that Gardens Oval 1 is a key regional facility and that it must be built and maintained to a premier standard. The plan also acknowledges the growing demand for the provision of sports lighting on Council-managed reserves to increase use and the need to support installation of sports training lights to help increase the capacity of reserves to accommodate additional uses and spread hours of availability.

The proposal is also in accord with the Northern Territory Government's *Northern Territory Sport and Active Recreation Master Plan* which defines the strategic priorities for government to guide sport and recreation policy. A key facility priority under *Strategic Direction 3* is lighting of playing fields, with planning and priorities for lighting of fields being guided by strategic planning and needs analysis undertaken by local governments managing the fields.

Consultation

In 2016 City of Darwin directed AFLNT and NT Cricket to consult stakeholders, residents and the wider community on their proposal to install lights at Gardens Oval 1 to guide council's decision-making on the proposal. Independent consultant, True North Strategic Communication was engaged to design and implement the consultation program and to prepare a report on the consultation findings.

In line with the Core Values of the International Association for Public Participation (IAP2), the consultation adopted a proactive approach to seeking comment from those most affected, explaining what would happen with people's input and a commitment to 'close the loop' by making the consultants' report public.

The goal of the consultation was to ensure stakeholders and residents were informed of the proposal, understood its implications and provided a chance to give feedback. The role of the consultants was to capture the breadth of views on the proposal, the reason for these views and issues raised.

Tactics included a fact sheet in all letterboxes and sending a letter to the unit owners in nearby streets and emails to key stakeholders informing them of the proposal and consultation process, a media release and an active social media presence.

The intent of this communication was to ensure people had information upon which to base their feedback and were advised of the consultation process.

The City of Darwin hosted a webpage with information on the proposal, including the fact sheet and a technical report that included a computer-generated visual assessment prepared by NTBS Consulting Engineers. Information was also provided on the consultation process, including a link to the online survey.

In total, 392 people completed the online survey, and 18 written submissions were received. A community meeting attracted around 40 participants. Many people were spoken to by phone, the consultants offered to meet with any resident who requested it and visited two units with residents to view the oval from their balconies, at Warrego Court and Buffalo Court.

At the community meeting, the consultants determined that many residents were finding it hard to visualise what the lights would look like. AFLNT offered a bus excursion to Asbuild Stadium in Palmerston. While Asbuild Stadium is the best local example of oval lighting, it differs to the lights proposed for Gardens Oval 1 in that Asbuild Stadium has six 26-metre light poles with lights illuminated to a maximum 600 lux, compared with the lights proposed at Gardens Oval 1 having four 32-metre light poles with lights illuminated to a maximum 600 lux. While it wasn't comparing 'apples with apples' it did give residents some idea of what the lights might look like in operation.

True North Strategic Communication is a member of the International Association for Impact Assessment (IAP2) and its staff are trained and experience practitioners. Our practice is guided by the IAP2 Core Values (www.iap2.org.au):

- the public should have a say in decisions about actions that could affect their lives;
- public participation includes the promise that the public's contribution will influence the decision;
- public participation promotes sustainable decisions by recognising and communicating the needs and interests of all participants, including decision makers;
- public participation seeks out and facilitates the involvement of those potentially affected by or interested in a decision;
- public participation seeks input from participants in designing how they participate;
- public participation provides participants with the information they need to participate in a meaningful way; and
- public participation communicates to participants how their input affected the decision.

It was difficult to ascertain the success of reaching the residents living in the highrise units (whether they read the letter and brochure dropped in their letterbox), to ensure they were aware of the consultation. For this reason, the media and social media were also used in an attempt to reach everyone potentially impacted.

Another key issue is transparency to ensure all people who provided input to the consultation know what happened to their comments, how they influenced decision-making and what decisions were made. Residents have been told that they will be sent a copy of the consultation report.

Consultation process

Level of engagement

The consultation was conducted in accordance with City of Darwin Community Consultation Policy 025 at a Level 3 "Participate" consultation and involves the promise that:

> *We will work to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how the public influenced the decision.*

Using the IAP2 principles that guide good engagement, the consultation was conducted at the levels of inform and consult.

LEVEL OF ENGAGEMENT	PROMISE TO THE PUBLIC
Inform	We will keep you informed
Consult	We will listen to your concerns, keep you informed, and provide feedback on how stakeholder's input influenced the decision
Involve	We will work with you to ensure your concerns are reflected in the alternatives developed, and provide feedback on how the public's input influenced the decision
Collaborate	We will look to you for advice, ideas and solutions and incorporate those into the decisions as much as possible
Empower	We will implement what you decide
©International Association of Public Participation www.iap2.org	

Consultation objectives

The objectives of the consultation were to provide the community and stakeholders with information on the lighting proposal and gather feedback on the proposal and report back to City of Darwin.

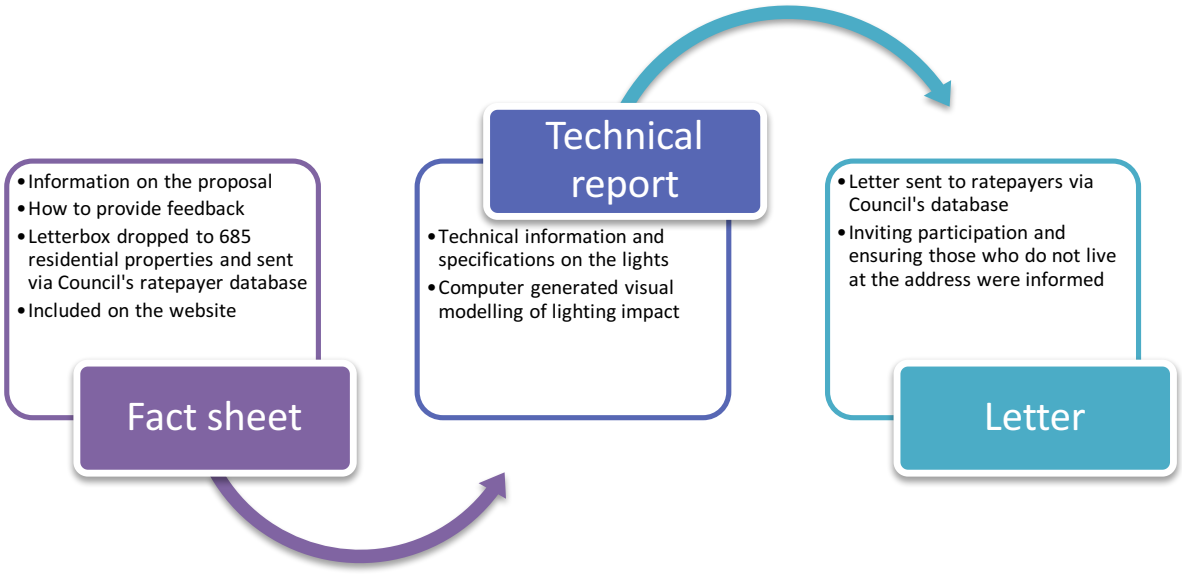
Approach

The consultation program ran for nine weeks from 13 June to 11 August 2017. This timeframe is two weeks longer than originally planned, and was extended due to the growing interest in the proposal in the last week of the original consultation period.

The consultation included a variety of communication material and methods to ensure people were aware of the consultation and able to contribute their views, and that input and feedback was balanced and representative of all stakeholders.

Communication materials

The communication materials included:



Fact sheet

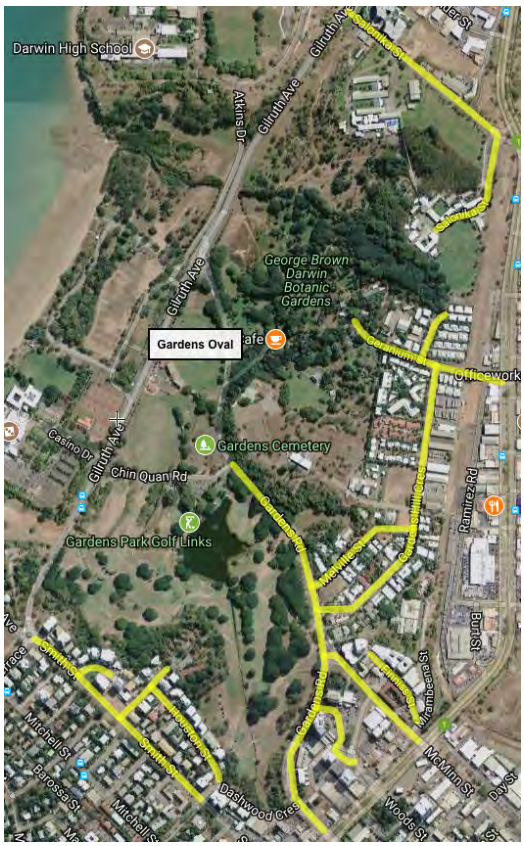
A fact sheet explaining the proposal and consultation program was prepared and delivered to key stakeholders, letterbox dropped to residents, sent to property owners and included on the website.

Letterbox drop

A letter and the fact sheet were delivered to Gardens residents at the start of the consultation period. They were also sent through City of Darwin's ratepayers' database to ensure that residential property owners living elsewhere were informed and invited to participate in the consultation.

The streets targeted were:

- Melville Street
- Gardens Hill
- Gardens Road
- Buffalo Court
- St John Court
- Houston Street
- Beagle Street
- Smith Street (Larrakeyah end)
- Finniss Street
- McMinn Street
- Geranium Street
- Salonika Street
- Warrego Court



About 685 units received letters and the fact sheet in their letterboxes, with a similar number sent via Council's ratepayer database.

Technical report

AFLNT engaged NTBS Consulting Engineers to prepare a technical report in June 2017 to provide information on the proposal for stakeholders, residents and the wider community. The report included the following information:

- background;
- stakeholders;
- reference documentation and applicable standards;
- definitions;
- design criteria;
- overview of design procedures and outcomes;
- existing outdoor lighting within the vicinity;
- hours of operation; and
- cost estimation.

The report also contained the following attachments:

- Attachment A – extract from AS 2560.2.3
- Attachment B – extract from Community Cricket Facility Guidelines
- Attachment C – extract from AS 4282 – Control of The Obtrusive Effects of Outdoor Lighting
- Attachment D – site plan
- Attachment E – Thorn Lighting Design and Calculation of the Effects of Obtrusive Light
- Attachment F – Luminaire Technical Data Sheet
- Attachment G – Light Pole 3D Model
- Attachment H – Artist's Impression Day time
- Attachment J – Artist's Impression Night time

The technical report and attachments are provided in **Appendix 1.**

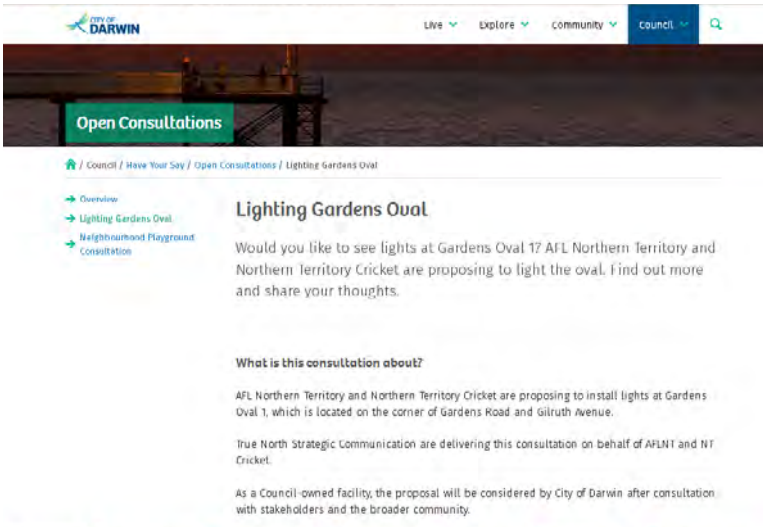
Communication methods

The communication methods included:

Website

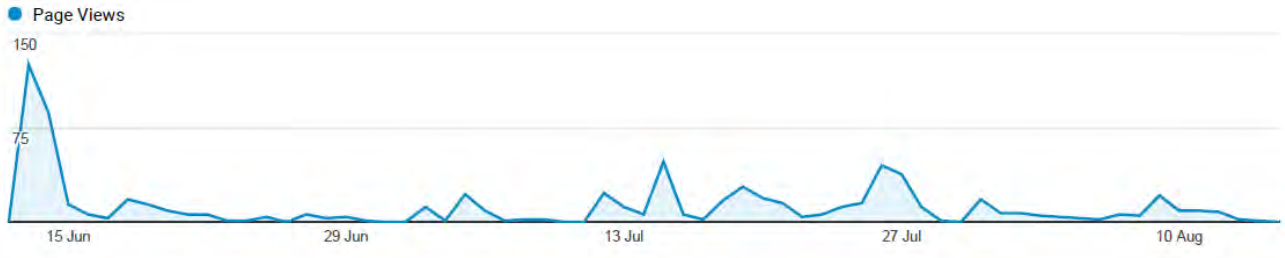
City of Darwin hosted the consultation webpage which included:

- information about the proposal and the consultation program;
- a link to the fact sheet and online survey;
- links to the technical report and attachments; and
- contact details for providing feedback or for more information.



^ www.darwin.nt.gov.au/council/have-your-say/open-consultations/lighting-gardens-oval

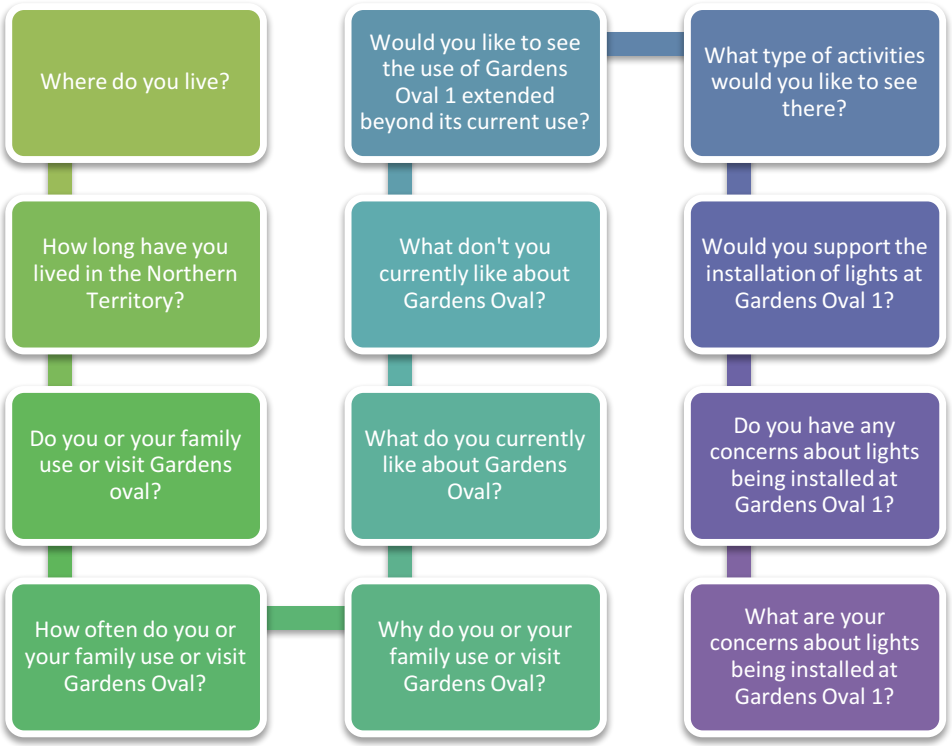
There were 773 views of the webpage over the nine-week consultation period.



^Google Analytics report of page views for www.darwin.nt.gov.au/council/have-your-say/open-consultations/lighting-gardens-oval

Online survey

An online survey was promoted during the consultation. It sought opinions and feedback about the proposal. The survey was advertised on Facebook, on City of Darwin's website, through sporting club networks, through stakeholder conversations and via the media. The survey sought answers to the following questions:



Meeting with stakeholders and residents

One-on-one meetings were offered to stakeholders who were identified as likely to have an interest in the proposal. Many stakeholders chose to fill out the survey rather than meet. Just two stakeholders (Football Federation NT/Port Darwin Football Club and Planning Action Network) chose to meet in person and make a submission.

One-on-one meetings were offered to interested residents after the letterbox drop and mail out. Fortunately, contact was made with individual residents with strong community networks, who helped organise suitable times for multiple residents to meet to discuss the proposal.

Two group community meetings were held at the request of residents:

- Raffles Plaza on 19 July;
- meeting facilitated by the Planning Action Network on behalf of residents of Warrego Court, Smith Street and Houston Street on 3 August.

The following organisations and individuals were contacted although not all chose to participate:

Sporting bodies

- AFLNT
- NT Cricket
- Football Federation NT
- Softball NT
- Tennis NT

Sporting clubs

- Local NTFL clubs
- Local Cricket clubs
- Local Softball clubs
- Gardens Tennis Club

Government

- Department of Tourism and Culture
- Elected representatives
- City of Darwin

Neighbouring commercial properties

- Skycity
- Mindil Beach Sunset Market Association
- Darwin Amphitheatre
- Eva's Café
- Gardens Park Golf Links

Interest groups

- Heritage Advisory Council
- Planning Action Network
- Field Naturalists Club Inc
- Cancer Council NT

Nearby residents

- Buffalo Court
- Warrego Court
- Houston Street
- Smith Street
- Other individual residents who made written submissions

Gardens Oval Community Meeting

A community meeting was held at Gardens Oval on Wednesday 26 July attended by about 40 people. AFLNT and NT Cricket representatives and NTBS Consulting Engineers presented information on the proposal and answered questions.

Around 40 people attended the community event

NTBS Consulting Engineers presented on the lighting design

Asbuild Stadium Site Visit, 9 August

Feedback during the community meeting on 26 July suggested that many residents were having trouble visualising what the lights would look like during operation. The consultant identified that residents may benefit from looking at similar lighting installed at Asbuild Stadium in Palmerston. AFLNT provided a bus to take residents to Palmerston to view the lights. This was advertised through contacts already established during the consultation and took place on the evening of 9 August. Nine residents took part.

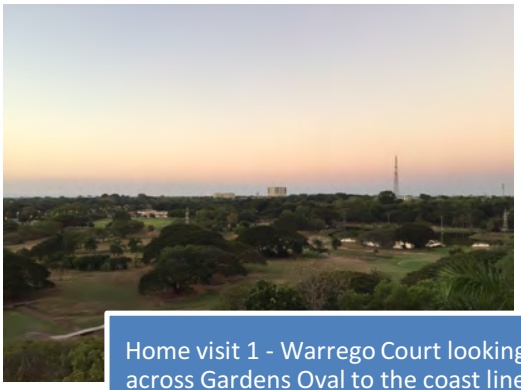
The key point AFLNT wanted to illustrate was that lights could be directed down with limited light pollution outside of this area.

Nine residents from Warrego Court, Smith Street, Houston Street and Buffalo Court participated

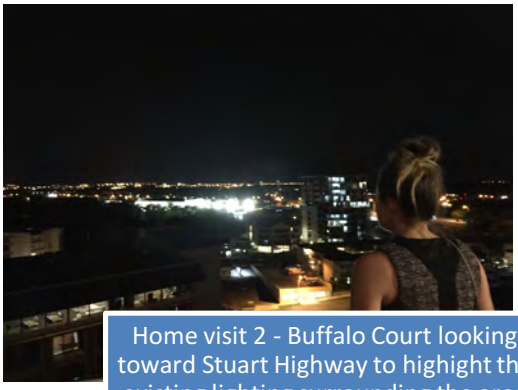
The lights at Asbuild Stadium are 600 lux and 26 metres high, compared to those proposed at Gardens Oval 1 which are up to 600 lux and 32 metres high

Home visits

True North Strategic Communication was invited to two homes during the consultation to view Gardens Oval during the day and evening. The properties at Warrego Court and Buffalo Court were visited on 8 August.



Home visit 1 - Warrego Court looking across Gardens Oval to the coast line



Home visit 2 - Buffalo Court looking toward Stuart Highway to highight the existing lighting surrounding the area

Centralised phone and email

True North Strategic Communication handled all phone and email queries and feedback during the consultation, the ensure all contact was centralised.

Feedback

Feedback during the consultation was received in the following ways:

In addition to the feedback received through the traditional methods, a significant amount of discussion regarding the proposal took place on social media leading up to the Territory Council elections on 26 August.

It's worth noting here that those playing or connected to sport predominantly provided their feedback through the online survey with **63%** of respondents identifying as an NTFL spectator, **54%** identifying as an NTFL player, **28%** identifying as a cricket spectator and **23%** identifying as a cricket player.

A small number of local residents participated in the survey, with **6%** of respondents identifying as living in The Gardens. Fifteen of the 18 submissions were from Gardens residents.

The feedback section of this report is presented as follows:

- Survey themes
- Submission theme
- Summary of feedback

Appendix 2 contains the complete survey report.

Appendix 3 contains the complete written submissions.

Personal information has been removed from the submissions including names, addresses and contact details to ensure privacy.

Survey themes

The online survey was open from 13 June to 11 August 2017, with 392 responses. Some of the percentages do not total 100% due to rounding. To ensure complete accuracy of all survey responses, spelling, punctuation and other errors have not been edited, therefore they appear in this report as they were entered in the survey. The complete survey report with all data is provided in **Appendix 2**.

Where survey respondents live

Survey respondents were asked where they live, with:

- **32%** from the Northern Suburbs
- **17%** from Darwin CBD/ Waterfront/ Larrakeyah /Cullen Bay
- **15%** from Parap/ Fannie Bay
- **11%** from Stuart Park/ Bayview/ Woolner
- **9%** from Palmerston
- **6%** from The Gardens
- **3%** from the rural area; and
- **6%** said other. Other included various Darwin suburbs, mainly Ludmilla and Nightcliff, interstate and intrastate.

The most notable statistic here is that only **6%** of survey respondents live in The Gardens with the majority (**32%**) from the Northern Suburbs.

Using and visiting Gardens Oval

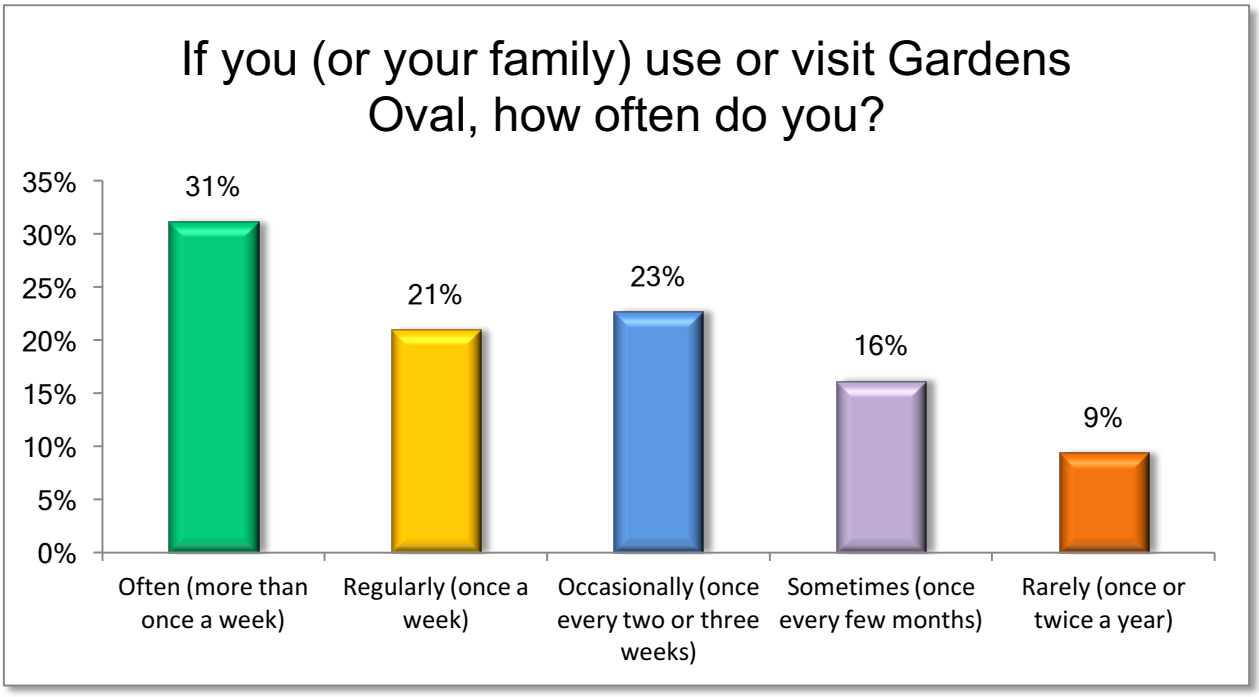
90% of respondents said they or their family use or visit Gardens Oval while **10%** said they or their family don't use or visit Gardens Oval.

Of the respondents who said they or their family use or visit Gardens Oval:

- **31%** said they or their family use or visit Gardens Oval often (more than once a week)
- **21%** said regularly (once a week)
- **23%** said occasionally (once every two or three weeks)
- **16%** said sometimes (once every few months); and

- **9%** said rarely (once or twice a year).

These results are shown in the graph below.



When asked why they or their family use or visit Gardens Oval:

- **63%** said as an NTFL spectator
- **54%** said NTFL player
- **28%** were cricket spectators
- **23%** cricket players
- **16%** were NTFL coach or other
- **6%** were cricket coach or other; and
- **13%** said other, with various answers including softball games and training, soccer, special and community events, exercise and volunteering.

People were able to select multiple answers for this question.

The most notable statistic here is that the majority of respondents were NTFL spectators **(63%)** and players **(54%)** and cricket spectators **(28%)** and players **(23%).**

What people like about Gardens Oval

Respondents were asked what they currently ***like*** about Gardens Oval. This was an open question to gather qualitative responses. There were 315 responses to this question. There were three key themes that emerged, with most responses able to be categorised into one or more of these themes:

- proximity/location
- good facilities and well maintained
- atmosphere/charm/history/beautiful setting.

A selection of responses is included below:

Proximity/location

Close to where i live. Always looks nice.

Proximity to the city and beautiful sunsets

Location, grandstand under cover, parking

Location and setting amongst botanical gardens and beach Home of the Waratahs

Good facilities and well maintained

Nice green and well maintained community amenity

Great Ground with good facilities. I train there and play there regularly during the wet season.

Location. Great sporting venue. Good facilities. As a spectator enjoy the atmosphere.

The main oval is magnificent. I love the cricket and junior AFL club.

Atmosphere/charm/history/beautiful setting

The heritage. The location. It's fantastic having the oval in amongst the city.

Picturesque and in a perfect position to be and developed into an iconic stadium. Gets as good a breeze as anywhere in Darwin, accessible from 3 directions, plenty of parking.

Incredibly scenic oval love it

It's aesthetically beautiful, surrounded by beautiful trees, with a nice intimate atmosphere for watching events.

It has so much history to many. I grew up going to this oval and now my kids are using it too. Its great for Darwin to grow with times and adding lights is a fantastic idea to grow local sports and events.

I love that the gardens oval has a real local community feel. When I first walked in the gates I felt the history and loved seeing how welcome everyone was. It is a real community facility.

What people don't like about Gardens Oval

Respondents were asked what they currently ***don't like*** about Gardens Oval. This was an open question with 298 responses.

Most people said the main thing they currently ***don't like*** about Gardens Oval was the lack of lights. Other answers were mainly about the facilities and security and the condition of the second oval. A selection of responses is included below:

Lack of lights

No lights, meaning when football training is on it is all dependant on day light. A large % of players at our club work until 6 o'clock onwards and miss half of training. If lights were available we could push back the start time of training to 6.15 - 6.30 and all players could train together.

My son plays long games of cricket for and has skin that burns very easily, even with sun protective clothing its difficult to prevent sunburn. To sit and watch the games can also be hot. Lights at Warratahs

will open up sport options to more families in the cool of the evening without damaging sun rays. It will also promote use of the the clubs hospitality arm. It would be a positive step forward for sport in Darwin.

Lack of lights that restrict training at later, cooler times or being able to play games under lights , which would allow a whole Waratahs or Banks family to play all their games from juniors to seniors in one day at one ground.

Limited training and playing options due to no lights.

No lights to train or not play in the heat of the night games

Facilities and security

Club rooms need renovating, change rooms need renovating

Lacking some infrastructure - lights, change rooms (currently not enough), poor security

No ability to train or play at night time. The change rooms are dated & need upgrading

Nothing This oval should be kept for what it has always been a venue for footy and cricket clubs only - the parking and surrounds are built and designed for this purpose only - to open it to other outdoor events festivals etc would negatively effect the quality of the grounds and pitch for sporting events - already there enough outdoor public space for festivals etc Keep some tradition in Darwin with this being a sporting only venue.

Lack of First Aid facilities under grandstand, used to be there years ago, plus the change rooms need an upgrade to include some sort of better cooling system, not necessarily air conditioning

security - too many break ins not enough top line events sheduled there

Condition of ovals

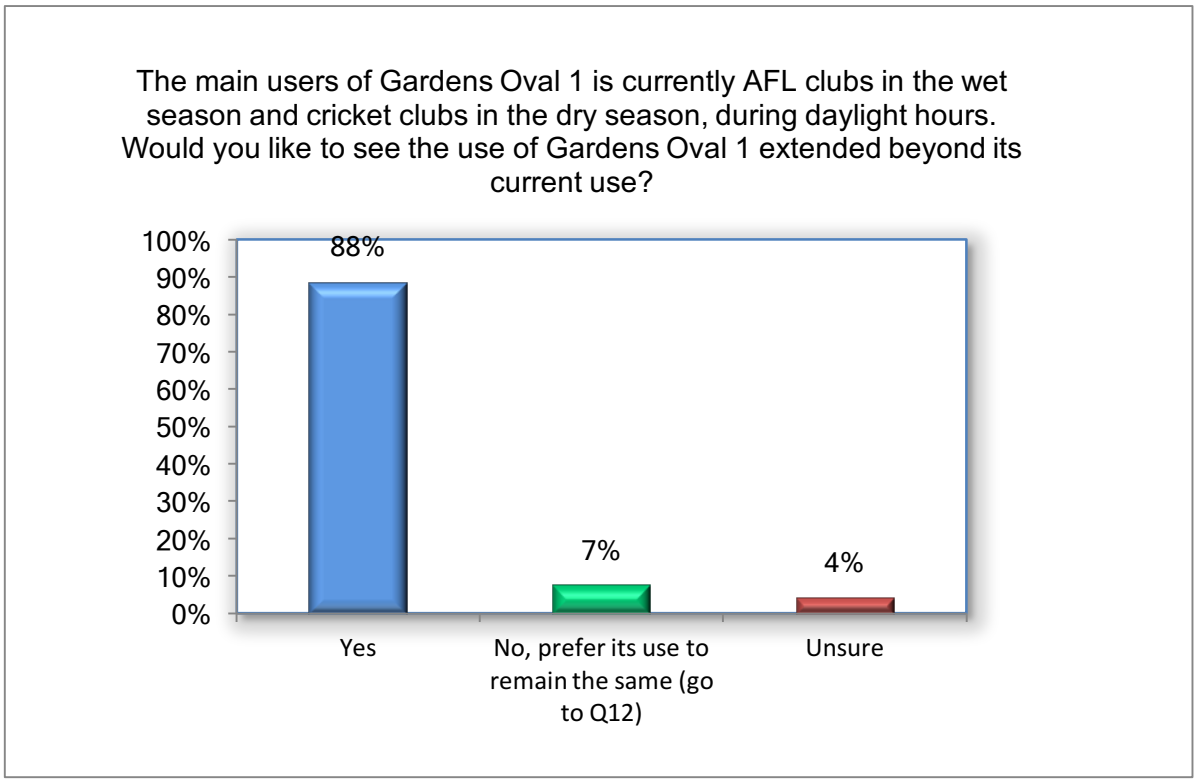
Muddy surface in the center on oval 1 during the wet season making it hard to play in.

The back oval could do with more seating for spectators and protection from the rain.

Need to keep replacing any big trees that are removed. It needs to have big shade trees.

Extending the use of Gardens Oval

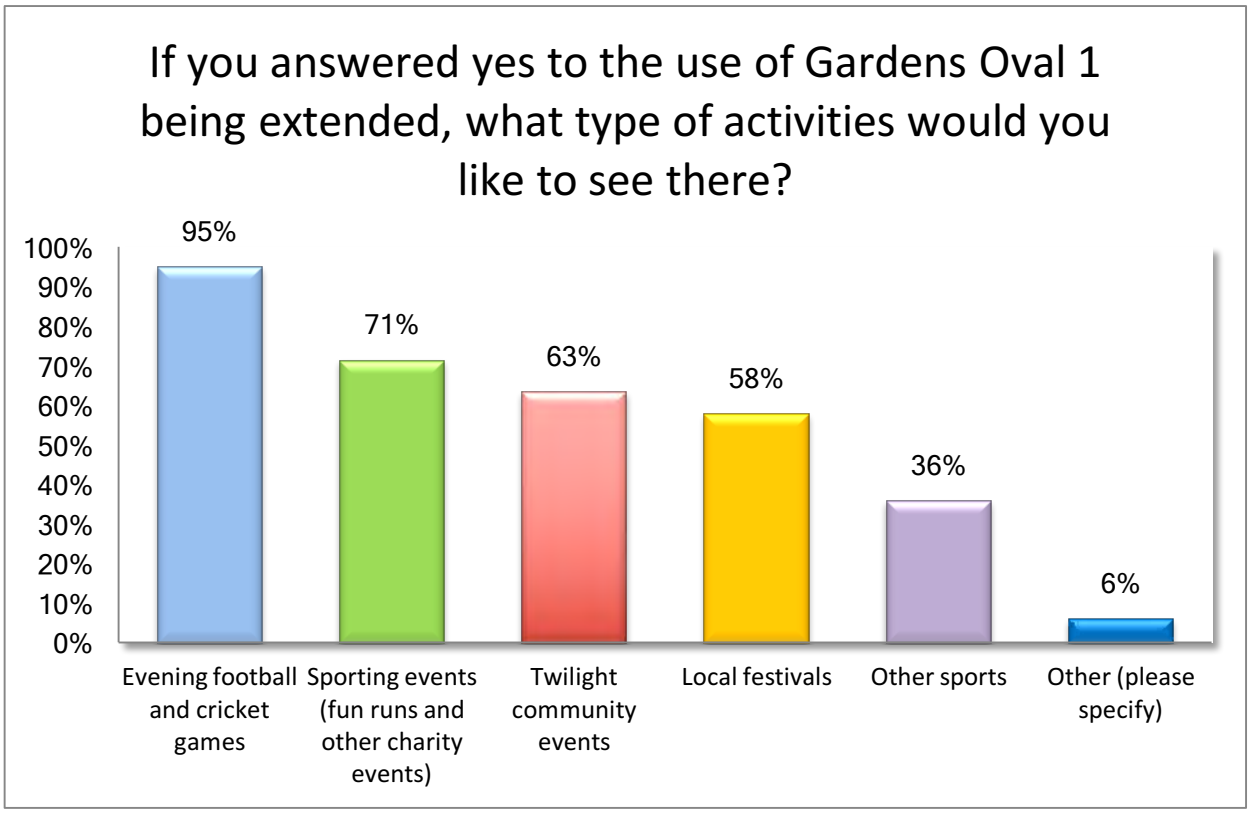
Most survey respondents (**88%**) said they would like to see the use of Gardens Oval 1 extended beyond its current use by the NTFL in the wet season and cricket in the dry season. This is reflective of the fact that most respondents were NTFL and cricket spectators and players. **7%** said no and **4%** said they were unsure.



For those who said they would like to extend the use of Gardens Oval 1:

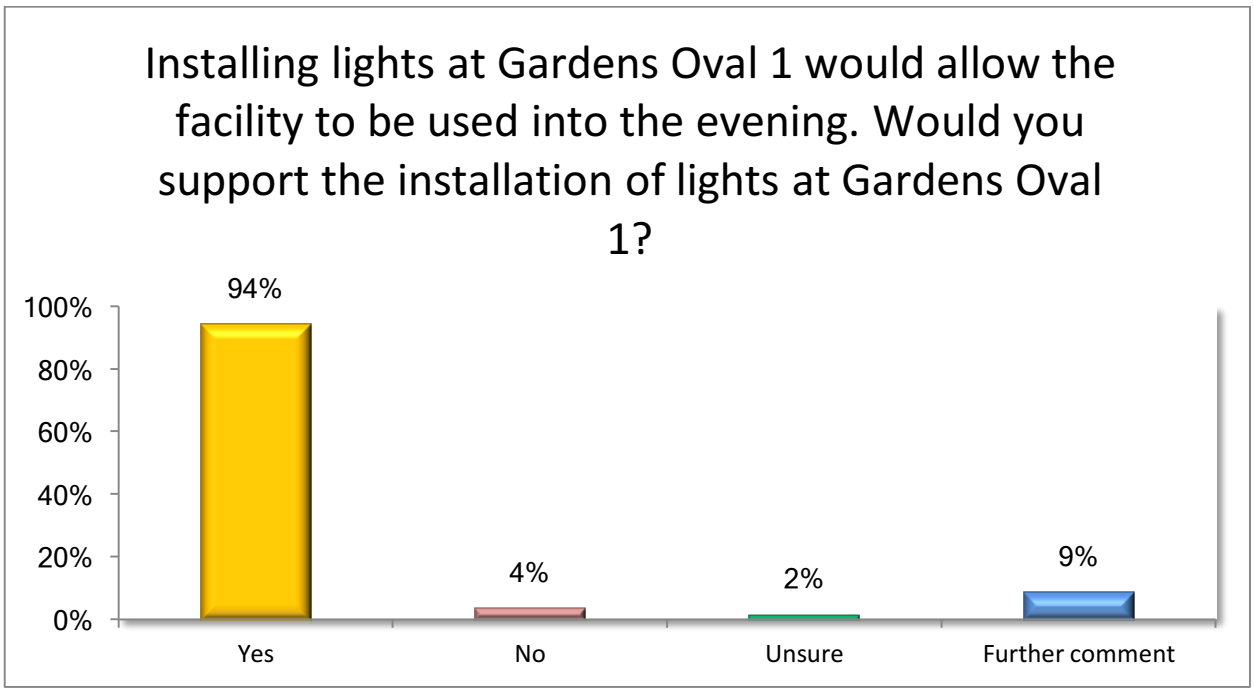
- **95%** said they would like to have evening football and cricket games;
- **71%** said sporting events (fun runs and other charity events);
- **63%** said twilight community events;
- **58%** said they would like to have local festivals at the oval;
- **36%** said other sports; and
- **6%** said other which included evening training, other sports and anything that could be there.

The results total more than 100% as respondents were able to select multiple preferences. The results of this question are shown in the graph below.



Support or oppose lights at Gardens Oval

Most survey respondents said they would support the installation of lights at Gardens Oval 1 with **94%** saying yes, **4%** saying no and **2%** were unsure. The results are shown in the graph below:



Respondents were given the option to provide further comment to support their answer with **9%** providing further comment. A selection of the comments is included below:

Those who support the lights:

I also own a property on gardens rd and I don't mind the installation

Absolutely. I would attend far more often to see evening matches.

This brings Darwin in line with most other jurisdictions across the country.

with limited residential directly adjacent the oval and with the proximity to mindil it would allow greater use of the space and resuce the need to play sport in the middle of the day which is extreme to say the least.

Games of footy on a Sunday at midday are incredibly depressing. Saturday night would be much funner!

I've been saying it needs lights for years.

Those who support the lights because of concern regarding day-time humidity and heat:

Let's get realistic. It's hot during the day. Night sport is much better and more appropriate in Darwin

It would be a great idea to get everyone out of the hot darwin sun during the day
Yes, Darwin needs more ovals capable of hosting evening footy games, to be able to shift games from the dangerous hot part of the day

It would be a great idea to get everyone out of the hot darwin sun during the day

Yes, Darwin needs more ovals capable of hosting evening footy games, to be able to shift games from the dangerous hot part of the day

evenings are the best time to play sport and have comunity activities because of our climate

My partner is an NTFL player for waratahs and their midday games are ridiculous seeing them play in the heat is dangerous.

Those who would support in certain circumstances:

If light did not spread beyond the oval and if it was not left on when oval not being used

If the light towers were retractable and only used until 8pm on weeknights I would be prepared to reconsider my current opposition to the proposed lighting.

it would help if a light of the same size and height was tested from the different locations that they will be placed and how the shrouds would help if at all.

Only would support the installation of lights if strict time frames were adhered to that did not impact and result in residents having to endure prolonged exposure at night to unnecessary bright lights. ALL

new lights installed should have SHROUDS to direct the lighting to the specific area that needs to be list without radiating unnecessarily to the entire vicinity

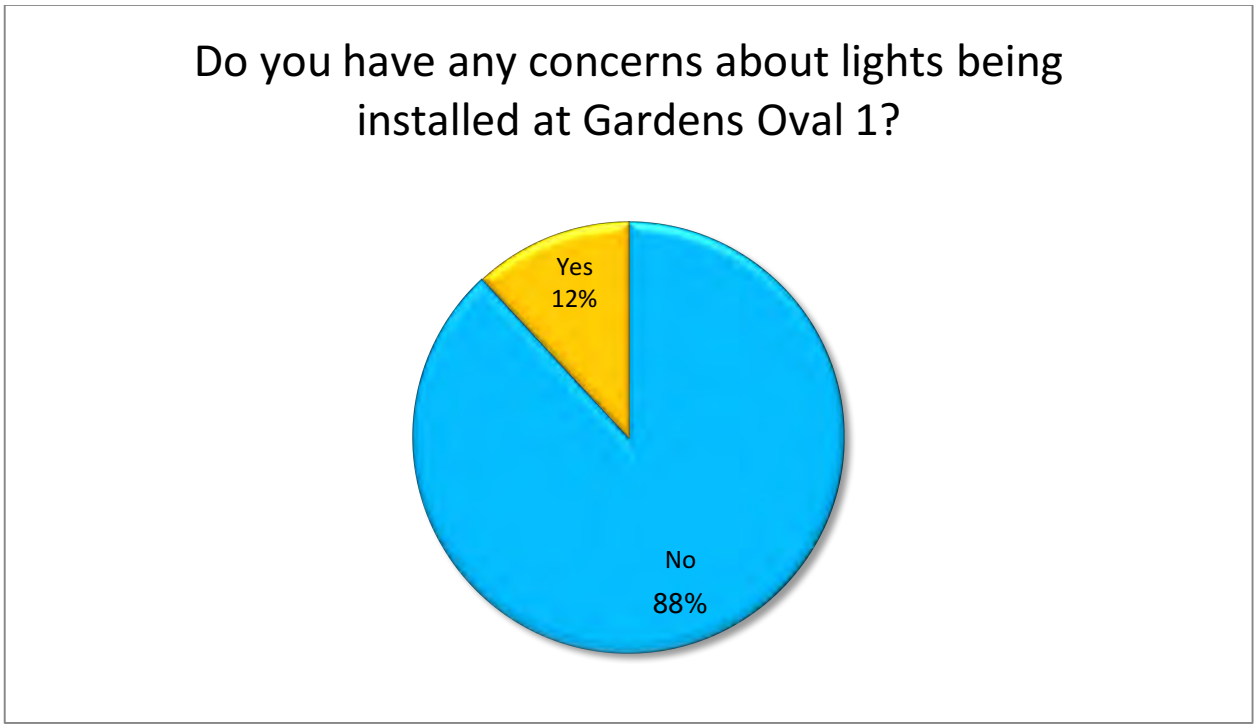
How would the cost be recouped. Is it a user pays proposal and/or an additional cost on the clubs that use the facilities which may not be able to support the additional expenses

Those who do not support:

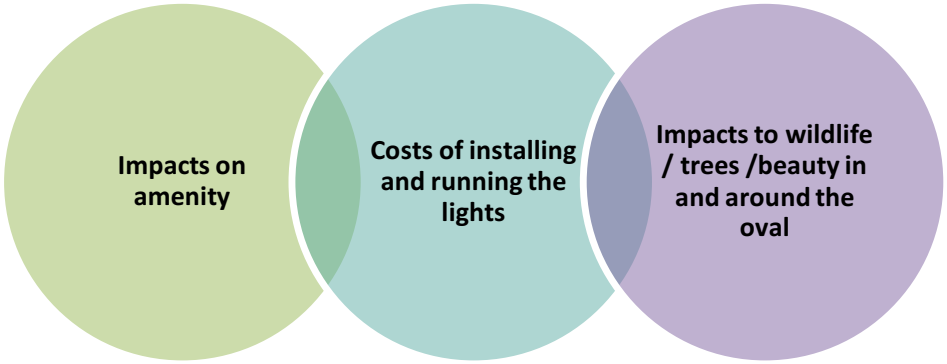
Too bright at night for all apartments in the area, compromise the tranquility of quite evening, devalue further apartment propert prices, people using or committees proposing to install the lights will not have their lifestyles compromised with glare. Just look at the Toyota / Kerry Holden caryards with their extremely bright lights installed without community consultation. No lights!!

Concerns about lights at Gardens Oval

Most survey respondents said they didn't have any concerns about lights being installed at Gardens Oval 1. Of the total, **88%** said they didn't have any concerns and **12%** did.



Those who ***did have concerns*** with lighting Gardens Oval 1 were asked to state their concerns. Their responses can be grouped into the following three themes:



A selection of responses is included below:

Impacts on amenity

I worry that people's lifestyle will be effected and I am not convinced by the Artist drawings (Image 8 –) is correct, Artist images often do not give a true reflection of how it will work or look, I want to see more true evidence of how these lights will look when on.

Impact on local residents, especially those living in Buffalo Court, Salonika Street, Warrego Court, Smith Street, Myilly Point, Houston Street, Harriet Place, Dashwood Place. The lights will spoil their views in the daytime, create light pollution at nighttime and attract insects.

We live nearby and the lights could be intrusive on our lifestyle.

affecting the amenity of owners homes in the area, who will be affected by the light as they ever look the oval.

As my other comments above. Also, the golf course on several occasion forgot to turn off their brights lights at night which meant light glare flooding into the bedroom until the next day.

the lights that will affect the use of my balcony and living room at night. At the moment there is a problem with the lights on the tennis courts and they are not as big as the proposed lights for the oval.

Excessive noise at night & the height of the towers causing an unsightly look in a pretty part of town.

Light pollution for locals Increased vandalism for the oval and surrounds Increased noise at night for locals

Costs of installing and running the lights

Cost - would it place a financial burden on the club that would lead to higher player fees? If the increase is small or non-existent then I would support it.

I would only like to see the lights activated/used when events are on. This way the costs of running the lights can be factored into the ticket/event cost.

The cost, is there a way Council can assist with the cost of the power usage and/or look at solar panels to assist with lowering ongoing costs.

Money should be spent on maintaining the oval. The poor drainage is a real health hazard. As a rural resident if they have lights we will have to travel even further for our sport. Very frustrating and it moves the Berrimah Line even close to DARWIN.

The money could be used to put training lights up for all 5 Alice springs ts clubs

Impacts to wildlife/ trees/ beauty in and around the oval

Be mindful of the beauty and history of gardens oval. Keep the large shade trees, don't remove any large iconic trees for the light poles but work around them.

However - I would not like to see trees or shade disturbed by installation. Need to retain big beautiful trees around the oval.

Make light towers with latest tech, limit the inherent ugliness associated with cheap fixes when installing light towers.

Submission themes

There were 18 written submissions received. They can be categorised as follows:

Objections

- Thirteen (13) objecting to lights proposal
- Twelve (12) from Gardens residents and one from PLAN

Support

- Three (3) supporting the lights proposal
- Two from Gardens residents, one from sporting association/club

Submissions

- Two (2) submissions from lighting companies

All written submissions are provided in full in **Appendix 2**, including photos and attachments. To ensure privacy, names and contact details have been removed.

Objections

The main basis for **objecting** to the proposal provided in the submissions can be grouped as follows:

Impact on local amenity

The main reason provided for opposing the lights at Gardens Oval 1 is that some residents feel that lighting the area six days a week will compromise their lifestyle.

Many feel that the area is already negatively affected by lighting from the golf course, the tennis courts and Skycity Casino. Some residents at Buffalo Court complained about 'lighting pollution' from the Stuart Highway, where some businesses operate lighting 24/7.

Some residents mentioned that they bought in The Gardens because of the unique environment and natural amphitheatre and uninterrupted views across the trees to the ocean.

Some believe that the impact of oval lights would be more severe because of the highrise nature of apartment living surrounding the area, with many buildings on the escarpment looking out over the gardens and ovals. They believe their elevation results in greater visibility and consequently higher impact from the lights. Some commented that a lit oval would be more appropriately located in a less populated area nearer to lower rise residential properties or at the Marrara sports complex.

Another concern is the increased activity in the area as a result of extended training and games, with more noise and traffic in the area and the resultant pressure on parking.

Another concern was the potential for anti-social behaviour as a result of crowds and movement to and from training and games. Some residents felt it was unfair that they bear the burden of the noise and inconvenience, while those getting the benefit of the lights go home to their quieter suburbs. It's worth noting here that some attendees at the community meeting commented that they are both local residents and sports people who approve of the lights, so the distinction is not necessarily clear cut.

Residents overlooking the oval fear their wellbeing will be affected by 'lights shining into their units', with the detriment to their amenity causing stress and lost sleep.

One resident said the existing glare from the golf course was so bad that he had previously invited Council aldermen to his unit to show how he could perform 'shadow puppetry' against the glare of his wall. This resident was angry that this complaint had remained unaddressed, which would influence his perception of the new proposal.

Some quotes that further explain these concerns are provided below:

> *We should be entitled just like everybody else to be able to come home and to enjoy peace and quiet whether it be watching tv or sitting outside on our balconies without the ... intrusion of lights 6 days a week.*

We spend most evenings on our balcony enjoying the nice view to Mindil Beach over the golf course and the ovals. Our objection is the light pollution that will adversely affect the pleasant ambience of our apartment which was an attraction when we purchased the place seven year ago.

Due to the basin topography of the area and the surrounding land use, Gardens Oval is totally unsuited for intense lighting from 32 metre high towers as proposed. Medium and high rise residential buildings occupy the higher ground surrounding the low lying oval. The glare from the upward light spill is excessive. Many residents will be affected by light pollution night after night but this would be of no concern to supporters of the lighting who for the most part do not live in the area.

I have actually changed my opinion and definitely want to give the feedback that the installation of shrouds on the proposed lights will NOT solve the radiant light issue to surrounding residents and will definitely negatively affect those living in the entire area.

My residence overlooks the oval. This will interfere with my privacy and I am totally opposed to this occurring.

It would not deal with the problem of the "riff raff". The Council is not the police force and I cannot believe those I spoke to genuinely believe that lighting the ovals will solve the problem.

They (the lights) will be a blot on the landscape from every direction, lit or unlit! The beams of light will disturb us rate paying humans as well as any bird, animal or wildlife in the vicinity.

I also object to the increased traffic that will be speeding up and down Smith Street and around the Lambell Terrace round about and down the hill past Skycity.

The light will still spill from activities of night activities and will clearly be in prominent view from my premises, especially noticeable in the evenings, which will impinge on the use and enjoyment of my own property. We already hear the afternoon training exercise drills, person's voices and whistles, ect. Fine with that as it is. But not 6 nights a week until 9pm.

The light generated from these towers do not only shine down it also eliminates upwards, as is evident where you can see the Light Towers at Marrara Sports complex when in operation 10 kilometres away where the light spill can be seen from my unit at Warrego Court Larrakeyah.

No matter what people say operating these Light Towers from 6 pm to late 6 days a week we have expressed it will be a huge intrusion on the quality of our life's and the cause of possible mental health, it will also have a huge effect on the surrounding Eco system wildlife and fauna in a small valuable area at night time.

Lack of trust

A strong theme in the submissions and comments during the public meeting is the lack of trust in council and government decision-making and consultation.

Many cited the Gardens Park Golf Links lighting proposal which attracted resident opposition in 2014. A lasting reminder for many residents of this proposal is a light which was installed as a trial on hole 1 in the early stages of the proposal. Residents spoke of that light and its continued use and their frustration in being unable to complain about what they see as continued unlawful use.

In relation to current proposal to light Gardens Oval 1, some residents noted that the scope had changed and that this might mean the scope will change again in the future. Reference was made to media coverage in 2016 which stated that the proposal was for 100 lux only.

There is a lack of trust in the ability of the shields to direct the light glare down, a view strongly influenced by past experience with the Gardens Park Golf Links lighting proposal where residents recount first-hand experience of the light shining up at their windows. The existing light glare from Skycity, the tennis courts, the

security lighting at the Gardens Oval carpark and businesses along Stuart Highway heighten a sense of cumulative impacts.

Finally, frustration was expressed in the lack of action in response to previous complaints about 'light pollution' in the area and a consequent lack of trust in managing light issues in the future.

Some quotes that further explain these concerns are provided below:

> *Trust is a major issue for me.*
>
> *The golf course lights are fitted with shades that are supposed to mitigate the upward spill of light but are not effective.*
>
> *So initially you get in principle agreement with something light on then you morph it into what you really are after. So sure as hell going to morph into 5000 lux for national & international standard matches in the near future.*
>
> *The community will be the last to know when the Council, the AFLNT and NT Cricket get together in the future to further morph this oval into a premier elite facility with super luxed lighting.*
>
> *Instead of a Gardens Precinct (Mindil, Casino, Little Mindil, Tennis Courts, Ovals & golf course) the community will end up the proud owners of 50+ hectares fully lit up – likely a legacy able to be seen from space.*
>
> *The bus trip organised to look at the Palmerston lights further entrenches mistrust in all parties concerned with this consultation process. We were shown lights with 6 poles with only 8 lights per pole (32 lights) at 100 lux and no definitive response to questions of height but possibly up to 28 m from a ground level aspect. Resident affected are going to endure 80 lights on 4 x32 m poles (20 lights per pole) at 600 lux in houses that at 15m plus higher. Not a comparison which engenders trust in those that conceived of this demonstration to show us what we might endure.*

Setting a precedent for more lighting in the Gardens area

A theme that emerged through the objections was the concern that allowing lights at Gardens Oval 1 would set a precedent and open up the rest of the Gardens area to be lit in the future, including Gardens Oval 2 and eventually the golf course.

Some mentioned that the darkened area around the botanical gardens was part of the appeal of moving to the area and that the prospect of the area progressively opening up to lights was concerning.

Some quotes that further explain these concerns are provided below:

> *We are already affected by the light spillage and noise from the Casino flashing entrance signs which is approximately 400 m away, not to mention the venues afternoon/ evening music, concerts and ongoing functions, landing and take off by Helicopters. The tennis courts lighting, which are also more than 400 meters away, already affect us by means of causing an Island of light in an otherwise darkened area, though tolerate this and appreciating and supporting the communities pursuits of physical and social activities, as it isn't 363 days of the year.*
>
> *Should the Garden Oval 1 proposal be accepted then AFL-NT and NT Cricket can then submit a further proposal for the second oval to have light towers also erected which would then produce even more light, it should also be considered if the first proposal by the above parties AFL-NT & NT Cricket is approved for Oval 1 a precedent has then been set for other facilities who have had past proposal denied they will be able to submit a proposal for lights towers which would then mean in a very small area there would be a number of high powered Light Towers operating that are producing large amounts of Light pollution and intruding into surrounding residents homes.*

Gardens Oval is not a Regional Oval

A few residents and PLAN questioned the appropriateness of Gardens Oval being classified as a Regional Oval under the City of Darwin's *Sports Field Plan 2016-26*. In its submission, PLAN stated that the surrounding Gardens environment and land use means that Gardens Oval can't meet the standard of this classification. PLan believes that the oval should be used for local games and events only.

Another view expressed in the objections was that building on facilities and services at Marrara is a better solution.

Some quotes that further explain these concerns are provided below:

> *Gardens Oval is an old oval, part of the Mindil Beach Precinct, sitting alongside the George Brown Botanic Gardens, next to the Mindil foreshore within a natural amphitheatre framed by the escarpment running from Myilly Point to Bullocky Point. It is a traditional public oval with an historically unique natural family atmosphere. It is a relatively small multipurpose oval which cannot possibly meet the standard of Council's new classification system as a Regional Oval.*
>
> *The NTAFL have ample oval access at Mararra and additional lighting there would in my opinion provide a solution to your needs into the foreseeable future.*
>
> *See The Sports Field 2016-2026 City of Darwin document which … which appears to address the needs of elite sporting bodies without consulting with and to the detriment of the general public.*
>
> *I would like to point out that Marrara Sporting Complex was built with tax payers money to give ALL sporting bodies access to all the facilities that were needed, to train and play a proliferation of sports. Why now, is there a need to open Gardens Park six nights a week with towering lights, presumably at Tax and Rate Payers expense, when we already have like facilities ready waiting and in the vicinity of where the people who want to use them, live. How many of the sports people involved actually LIVE in this area?*

Preservation of Darwin's green belt

Residents spoke of the need to preserve Darwin's green belt for the benefit of people, animals and birdlife. PLan also spoke of the importance of this in their submission. One resident suggested an environmental report on light and noise pollution before any decision is made on lighting the oval. The proximity to the George Brown Botanical Gardens and any impact on nocturnal animals there should also be investigated.

Some quotes that further explain these concerns are provided below:

> *I really am not sure why this area of Darwin … a green belt area in Darwin is always under pressure in some way! This … area is really a very special spot! It is an area that gives real character to Darwin.*
>
> *Not only will these lightening towers be a real eyesore , but there will also be an impact from this kind of lightening on our local nocturnal wildlife.*
>
> *We really need to be putting all efforts into beautifying the place not making it less attractive!*
>
> *Others and I wish too see the Darwin City green-belt park land preserved as a day time recreational space only; objecting to any possible increase of nuisance behavior which may created by ongoing evening activities and will possibly seek to place a perpetual injunction on such future lighting development proposals.*
>
> *I am concern for the flora and fauna aspects of the course, due to the ongoing lighting of the course and do not believe that the Department of Lands, Planning and Environment have properly evaluated the situation, concerning the abundant movements of native nocturnal species with in the vicinity which nest or use the grounds of the adjacent Botanical Gardens nature reserve area, wildlife with the in the wider & recognized 'Gardens/Mindil Beach Area green belt'.*

Inadequate information available to understand real impact

Given the lack of trust, some residents felt that computer-generated models that show light glare and spill on the surrounding area is inadequate. Some felt that a physical light spill test or trial is needed so residents can see the real impact. Again residents spoke of the elevated residential properties looking over Gardens Oval and the mistrust in the effectiveness of shrouds/sheilds to direct the light down.

Some quotes that further explains this concern are provided below:

> *I also disagree with any refusal, or statements, which infer to be impractical to install a temporary lighting structure to see how neighbors would be affected. As this is the only manner of how the proposal can be properly gauged. As we saw by the Gardens Golf Course Lighting, the computer generated spill reports were hardly worth the paper they were printed upon, only by a live lighting experience was this in fact witnessed and agreed and subsequently upon. Maybe the whole proposal requires lower lighting towers with less ambitious lighting levels. 12m towers and 100 Lux maximum. For training purposes only.*
>
> *it would help if a light of the same size and height was tested from the different locations that they will be placed and how the shrouds would help if at all.*

Support

Three written submissions supported the lights proposal. The most detailed was the joint submission by the Football Federation NT and Port Darwin Football Club regarding the impact of heat related illness in sport played in Darwin's heat. The submission explains that sport is played in Darwin under hotter and more humid conditions than most other places in Australia. This represents challenges for sporting administrators, not the least of which is the appropriate scheduling of game times.

> *What has become obvious during my investigation of this matter, is that if sports administrators in Darwin (and beyond) are to take heat risk and their duty of care to players and other participants seriously, then they need to amend their game schedules to accommodate more games during cooler times of the year, and cooler times of the day.*
>
> *To support these changes to game schedules, sports grounds around Darwin (and beyond) will need to be provided with lights to support more night time matches (and training sessions).*
>
> *Sports administrators cannot ignore the very serious risks posed to players and participants associated with the heat and humidity in Darwin and councils and grounds/venue owners/managers need to play their part inproviding suitable facilities to support the safe conduct of sport in Darwin (and beyond).*

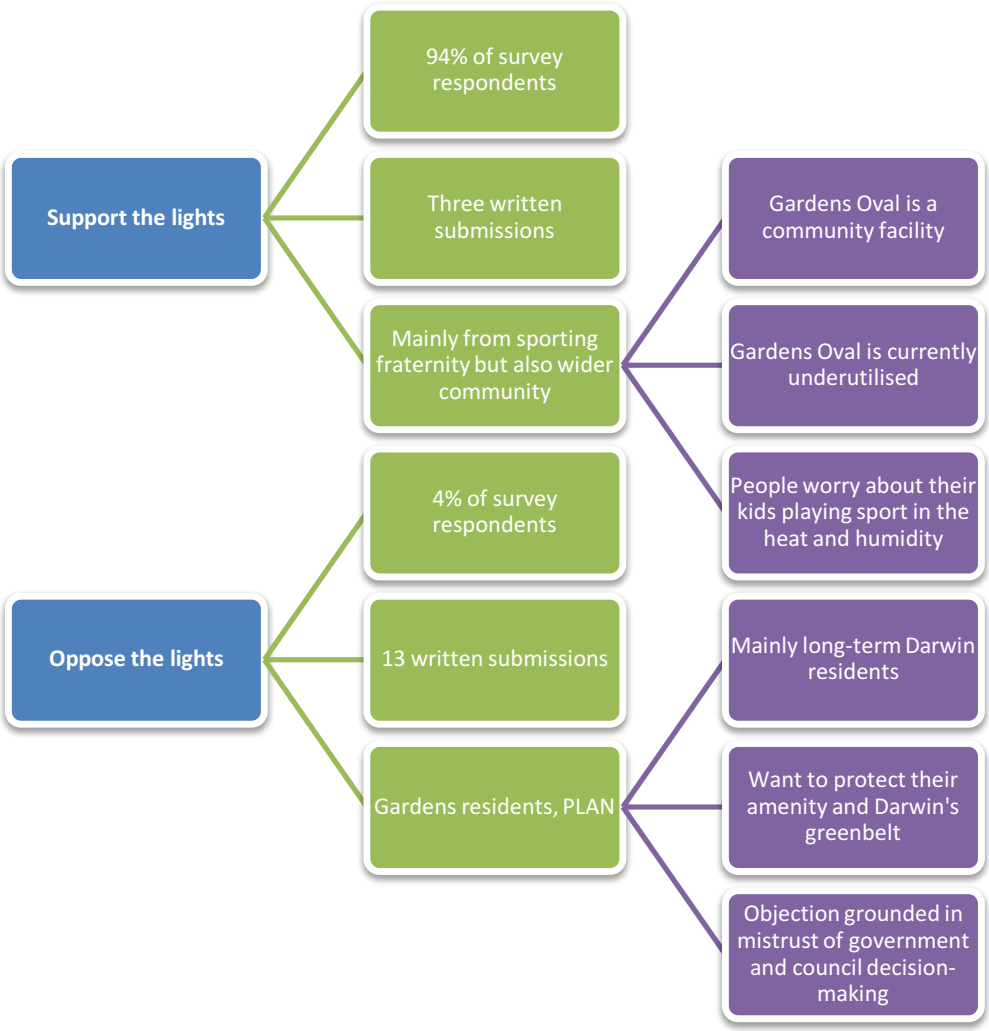
The concern regarding playing sport in the heat and humidity of the wet season day was raised by many survey respondents (see above) and is a strong theme that has emerged in support of the lighting proposal.

The other two submissions offering support were from Gardens residents, and were brief:

> *I am a local resident of The Gardens and welcome the extra use of the oval to increase community participation in sport.*
>
> *I think it would be fantastic and well overdue for the oval to be used at night time and would be a massive financial boost for the hosts of the Oval, Waratah cricket and football to be able to use the club to its full benefit at last, it's a white elephant as it is. I can't see it being any problem for us at Raffles and other parts of the Gardens community so long as it is kept to a reasonable hour.*

Summary of feedback

The feedback can be summarised as follows:



The case supporting the lights

It's not desirable but an essential upgrade.

It would be a great idea to get everyone out of the hot darwin sun during the day

It would be so fantastic for the cricket and football clubs if Council decides to put lights in.

Yes, Darwin needs more ovals capable of hosting evening footy games, to be able to shift games from the dangerous hot part of the day

This should be done asap - fewer daylight hours in the dry season restricts the usage times for oval 1

I've been saying it needs lights for years.

Absolutely. I would attend far more often to see evening matches.

Friday night footy! Thursday twighlight 20-20 matches and then stroll to mindil markets for dinner

The case opposing the lights

Extra noise and congestion from cars / traffic and crowds / sirens, street parking issues, plus light pollution. Also over time the amount of usage and times will expand to what is stated currently as more organisations wish to use the facilities, even extending to outside of sporting organisations. I don't trust councils to keep their word on what they state will occur. In the future there will be more and more changes to usage. Then our property values may be damaged.

Impact on local residents, especially those living in Buffalo Court, Salonika Street, Warrego Court, Smith Street, Myilly Point, Houston Street, Harriet Place, Dashwood Place. The lights will spoil their views in the daytime, create light pollution at nighttime and attract insects.

As my other comments above. Also, the golf course on several occasion forgot to turn off their brights lights at night which meant light glare flooding into the bedroom until the next day.

High potential for light and noise pollution interfering with the amenity and enjoyment of my home.

*I live at (*address removed for privacy*) Larrakeyah, the view from my balcony is over golf course/gardens oval & bright lights would be right in the in the middle of that view.*

the lights that will affect the use of my balcony and living room at night. At the moment there is a problem with the lights on the tennis courts and they are not as big as the proposed lights for the oval.

That it takes way from the ambience of the region. The Gardens is a beautiful spot during the day and is very quintessential Darwin as it currently stands. There needs to be pockets of Darwin that remain as reminders of heritage to the city.

You can do your utmost to put in your so called unobtrusive lightings however it has been demonstrated to me that lights on off angle glare brightness are still under the control of someone and to date those in charge of the current lighting of the car park in the complex have demonstrated they have no desire to turn down the lights in the car park. I asked them some time back to simply turn them down so they covered the car park (which was the reason they gave me for being there) instead of shining all the way up the hill into my lounge room. Locals had to undergo a long and arduous campain to stop the lighting of the golf course. That succeeded but such action takes its toll on all concerned. And now we are under threat of having to so campaign again. The same arguments these 2 groups use for lighting the oval can be used to light the adjacent "practice" oval and then the golf course will have another go. So tired of having to constantly be viligant about amenity of our living environs.... so tired I am plain Angry that once again the community must take on the "big players" just to protect their amenity. The questions you ask above about gender age address demonstrate to me that you will use the responses to "shuffle" the numbers of or "weight" the responses of submitters. So immediately on opening up your survey you destroyed my trust in your results.

Concerns

Some people did not oppose the lights but expressed some concerns which included:

- the shields won't be effective in minimising light spill;
- the lights may be left on longer than required;
- the costs of installing and running the lights is unclear;
- unsightly light towers will ruin the beauty of the area;
- impacts to nearby wildlife and the trees on the oval is unknown.

If light did not spread beyond the oval and if it was not left on when oval not being used

They might be too bright.

ALL lights must have SHROUDS to direct the lighting to the specific area that requires the lighting rather than glaring to the entire vicinity and surrounds negatively impacting upon residents. Also strict time lines should be given that the lights are only on at the necessary times in use - the tennis courts near Mindil are UNNNECESSARILY left on until late into the night with the glaring bright lights negatively impacting upon our home

Overall I think using the oval to it's fullest capacity is a good thing.Please keep in mind light & noise issues for the residents.Not all residents work 9am to 5pm Monday to Friday.I work Friday to Tuesday 10pm to 6am.I actually try to sleep between 6pm to 9pm.It's a peaceful environment to live at the moment.I'm not against progress & accept it's good for the community overall.

Concern about the clubs which use the facilities being subject significant increase in lease costs to amortise the capital costs as well as their ability to afford to pay the power costs. Given that most clubs are already cash strapped

Cost to the community or users - who is paying for the lights? security and safety to the area at night time. Also increased traffic across the road to the car park with kids at night - needs a speed reduction

Trenching for power cables, light footings, damage to trees, turf, irrigation infrastructure, durations of works

As long as they are as environmentally friendly as the NT Gov can make them there should be no problem, they will not be on all hours of the night. They are not a problem in the northern subburbs and they were built years ago and I'm sure before plenty of advancements in technology

impact on local wildlife. impact on who will pay for them - both initially and ongoing lighting costs. are AFL and cricket going to pay for them being turned on just for them, seems a small section of the population will benefit. pllease ensure the most environmentally appropriate lighting is chosen

Concern about the clubs which use the facilities being subject significant increase in lease costs to amortise the capital costs as well as their ability to afford to pay the power costs. Given that most clubs are already cash strapped

Concerns are if corners are cut and the lights installed are not appropriate for use. If this means waiting another 1-2 years or more for funding then it would be worth the wait for a better product.

The longevity of the technology and how Council may recoup running costs for the lights.

The costs, the asethics, over use of the facility, increase the amount of time that the club house at the oval would be open.

Be mindful of the beauty and history of gardens oval. Keep the large shade trees, don't remove any large iconic trees for the light poles but work around them.

Questions and answers during consultation period

Residents asked a number of questions during the consultation period some of which are summarised below along with the answer provided.

Question	Answer
What is being proposed?	• Gardens Oval consists of a pavilion and two ovals. • This proposal is for lights to be installed at Gardens Oval 1 which is the oval located on the corner of Gardens Road and Gilruth Avenue and adjacent to the George Brown Botanic Gardens and the Amphitheatre. • Gardens Oval 2 is located on the other side of the stadium and is not included in the lights proposal.
Who is proposing lights at Gardens Oval 1?	• AFLNT and NT Cricket approached City of Darwin in 2016 about installing lights at Gardens Oval 1. • Council directed AFLNT and NT Cricket to consult with stakeholders, residents and the community before deciding on whether to support the proposal.
Why are lights needed?	• AFLNT and NT Cricket need more space to grow their sports in the Territory. • Both are being held back by the absence of lights due to training time restrictions. • AFLNT needs access to lit facilities to sustain its substantial growth in the women's and junior competitions. • NT Cricket has just one lit facility (with only two wickets) available in the entire Darwin and Palmerston region. There is currently no capacity to respond to the demand for cricket in alternative times and formats. Chief amongst this is a social women's competition, which currently must be run on a weeknight prior to sunset, which is very restrictive.
Why Gardens Oval?	• Gardens Oval is centrally located and iconic. • It is located within close proximity to the Darwin CBD and popular beaches and entertainment venues.

	• Gardens Oval 1 is currently limited to daylight use and is not fulfilling its potential as a sporting venue. • Lighting at Gardens Oval 1 is a significant investment that will secure Gardens Oval as a critical piece of sporting infrastructure for inner Darwin.
What sort of lights are proposed?	• The proposal includes the installation of four light poles that achieve a maximum brightness of 600 lux in the centre of the oval. The steel poles would be 32 metres in height. The recommended system utilises metal halide luminaires each with a glare shield and rear visor to prevent unwanted light spill to the surrounding area.
How bright will the lights be?	• 600 lux would be the maximum illumination of the lights. o Cricket requires 600 lux at the wicket (Friday) o Football requires 300 lux across the field (Saturday) o Cricket and football training requires 100 lux only (weekdays)
How often would the lights be turned on?	• Use of the lighting would be restricted from Monday to Saturday to 9:00pm.
Will it attract more people to the local area resulting in more noise, sirens and cars?	• Training during the week is unlikely to significantly increase noise and activity or have a negative impact on surrounding areas. • During night games on Saturdays there may be more traffic around the oval. Spectators would be advised to be mindful of neighbours during the event and when leaving. • Extra activity during occasional night games would generate movement in and around the oval.
Which sports will be able to use the oval given its hours of operation will be extended by the lights?	• NTAFL and NT Cricket clubs are currently the main users of Gardens Oval, and it would be these sports who will initially take up use of the oval during the evening. • As a Council-owned facility, Council's will decide on the use of the oval by other sporting clubs and events into the future.
Who is paying for the lights?	• Funding for this proposal is available through the NT Government's *Urban and Regional Oval Lights Program*.
How much will the lights cost?	• The cost of installing the lights is estimated to be $1.2 million.

What is the proposed timeframe for constructing the lights?	• AFLNT and NT Cricket would like the lights installed as soon as possible following necessary approvals.
Will the illumination be increased beyond 600 lux in the future at Gardens Oval?	• No, the maximum illumination will be capped at 600 lux.
Who makes the decision about whether the lights can be installed at Gardens Oval 1?	• As a Council-owned facility, City of Darwin will decide whether it approves the proposal.

Next steps

This report has been prepared after a nine-week consultation process on the proposal by AFLNT and NT Cricket to install lights at Gardens Oval 1.

It is recommended that the next steps are:

- Council consider the consultation and report, including the feedback received by stakeholders, residents and the community, noting:
    - Support for the installation of lights at Gardens Oval 1 is high at 94% of survey respondants. The supporters are made up of individuals and organisations engaged in sport and other leisure activities, and families across Darwin who's kids play sport.
    - Thirteen (13) written objections were received, 12 from residents who live in the surrounding area and one from PLAN.
- Council release the report to the public on City of Darwin's website, and authorise True North Strategic Communication to provide a copy to those who made a submission or requested to be kept informed; and
- Council's decision on Gardens Oval 1 be communicated back to stakeholders, residents and the community, with reference to the information gathered during the consultation process and how this guided Council decision-making.

APPENDIX 1 – TECHNICAL REPORT AND ATTACHMENTS, NTBS CONSULTING ENGINEERS

DOCUMENT: REPORT ON A NEW SPORTS LIGHTING INSTALLATION FOR GARDENS OVAL No.1

DOCUMENT NO: D478-RPT-001

Project No: D478

Client: AFLNT & NT CRICKET

Project Location: GARDENS OVAL No.1

Project Title: GARDENS OVAL SPORTS LIGHTING

(Where applicable)

Project Manager Authorisation: .....

Client Authorisation: .....

				APPROVALS		
Issue	Date	Pages	Issue Description	By	Check	Approved
A	25/05/17	10	Preliminary - For Initial Review Only	KF	WP	_____
B	02/06/17	10	Preliminary - For Initial Review Only	KF	WP	_____
C	06/06/17	10	Preliminary - For Initial Review Only	KF	WP	_____
☑ Entire Document Issued this Revision			Remarks: *Issued for review and comment*			
☐ Revised Pages Only Issued this Revision			Revised Page Nos.			

TABLE OF CONTENT

1.0 EXECUTIVE SUMMARY

A sports flood lighting installation to achieve a maintained horizontal illuminance of 600 Lux at the wicket and a maintained horizontal illuminance of 300 Lux for the entire oval can be achieved whilst complying with the requirements of Australian Standard for the Control of the Obtrusive Effects of Outdoor Lighting, AS4282 at Gardens Oval No.1

The recommended system is based on a four-pole scheme utilising metal halide luminaires with remote control gear trays to be housed in an enclosure at the base of each light pole.

BACKGROUND

NTBS Consulting Engineers Pty Ltd were engaged by AFLNT and NT Cricket to:

Undertake a preliminary sports lighting design for Gardens Oval No.1

Provide a report outlining the design principles and results

Provide a brief description of the system and the works that would be required to be undertaken to achieve recommended lux levels at the playing surface for Australian Rules Football and Cricket, and

Ultimately determine if the proposed installation would comply with the relevant Australian Standards.

STAKEHOLDERS

The following key stakeholders have been involved in the preliminary design process:

City of Darwin Council

AFLNT

NT Cricket

True North Strategic Communication

REFERENCE DOCUMENTATION & APPLICABLE STANDARDS

The following documentation has been used as a reference during the preliminary design process:

AS/NZS 3000:2007 Electrical Installations – Wiring Rules

AS/NZS 3008:2017 Electrical Installations – Selection of Cables

AS 2560.1 Sports Lighting – General Principles

AS2560.2.3 Sports Lighting – Lighting for Football

AS 4282 – Control of The Obtrusive Effects of Outdoor Lighting

Community Cricket Facility Guidelines – Guidance Note 4 – Floodlighting

5.0 DEFINITIONS

Luminous Flux: The measure of the quantity of light. Lumen: The derived unit of luminous flux.

Illuminance: the luminous flux arriving at a surface divided by the area of the illuminated surface Average Horizontal Illuminance: The arithmetic mean of the horizontal illuminance values determined for all of the points in either the calculation or measurement grid as applicable to the method of determination.

Lux: The SI (international system of units) unit of illuminance. (1 lux = 1 lumen/sq.m)

Luminaire: Equipment which houses the lamp and directs the light in desired directions. It includes items necessary for fixing, protecting and operating the lamp (i.e. the light fitting).

DESIGN CRITERIA

The following design criteria were established prior to commencing the preliminary sports lighting design:

An average horizontal illuminance of 600 Lux at the square for cricket (client requirement)

An average horizontal illuminance of 300 Lux for football (client requirement)

A minimum horizontal uniformity of 0.7 (ratio between minimum and average illuminance)

A minimum horizontal uniformity of 0.5 (ratio between minimum and maximum illuminance)

A maximum allowable lux level on the vertical plane at the boundary of nearby residential buildings of 10 Lux

Refer to Attachment A, extract from AS 2560.2.3 which outlines Lighting Criteria for the various levels of football.

Refer to Attachment B, extract from Community Cricket Facility Guidelines for the various levels of cricket.

Refer to Attachment C, extract from AS 4282 – Control of The Obtrusive Effects of Outdoor Lighting for details pertaining to allowable lux levels at residential boundaries.

7.0 OVERVIEW OF DESIGN PROCEDURES AND OUTCOMES

Note: The design outcomes stated in this report are estimates only based on a preliminary and non-exhaustive sports lighting design and are not to be used for tender or construction purposes.

Light Poles

A site inspection was carried out on the 10th of April 2017. It was determined that a four-pole scheme would be best suited to the oval due to the position of existing major features such as the grandstand, clubhouse and trees.

The mounting height of the proposed floodlight installation was calculated utilising the four-pole scheme as outlined in Australian Standards AS 2560.2.3 – Sports Lighting – Lighting for Football and also complies with Community Cricket Facility Guidelines – Guidance Note 4 – Floodlighting

The poles are required to be 32metres in height, shall be fabricated from steel and have a bored pier footing or similar. Careful consideration needs to be given to the final and exact location of each light pole during the detailed design and construction process with respect to existing features, structures and concealed services.

Luminaires

The four-pole sports floodlighting system has been modelled on a professional lighting design software. The proposed luminaires are Thorn Champion 2000W Metal Halide Asymmetrical Floodlights complete with glare shields and rear visors. From the model, we have been able to determine the approximate number of luminaires required to meet the design criteria. Table 1 outlines the number of luminaires required to achieve the illuminance levels for various levels of play.

Table 1

Code	Level of Play	Average Horizontal Illuminance	No. of Luminaires
Football	Amateur/Semi Pro Training	50 Lux	16
	Amateur Club Competition	100 Lux	24

Cricket	Semi Professional Competition	300 Lux	60
	Professional Competition	500 Lux	72
	Non-body Contact Training	100 Lux	24
	Match Practice	300 Lux	60
	Non-televised Matches (Class 2)	600 Lux	80

Control of Glare and the Obtrusive Effects of Light

The proposed design has taken into account the effects of glare on both the players, spectators and residents in the surrounding area. The installation height of the luminaires has been calculated such that they comply with the parameters of glare as stated in Australian Standards AS 2560.2.3 – Sports Lighting – Lighting for Football.

The installation as a whole has been designed to comply with Australian Standards AS 4282 – Control of the Obtrusive Effects of Outdoor Lighting. Further consideration should be given to obtrusive light effects during the detailed design and construction process.

The proposed light fittings are supplied with a glare shield to prevent any unwanted light spill to the surrounding area. The lighting manufacturer has provided a secondary calculation to verify that the installation will comply with the requirements of AS 4282 – Control of the Obtrusive Effects of Outdoor Lighting, Refer to Attachment E for details.

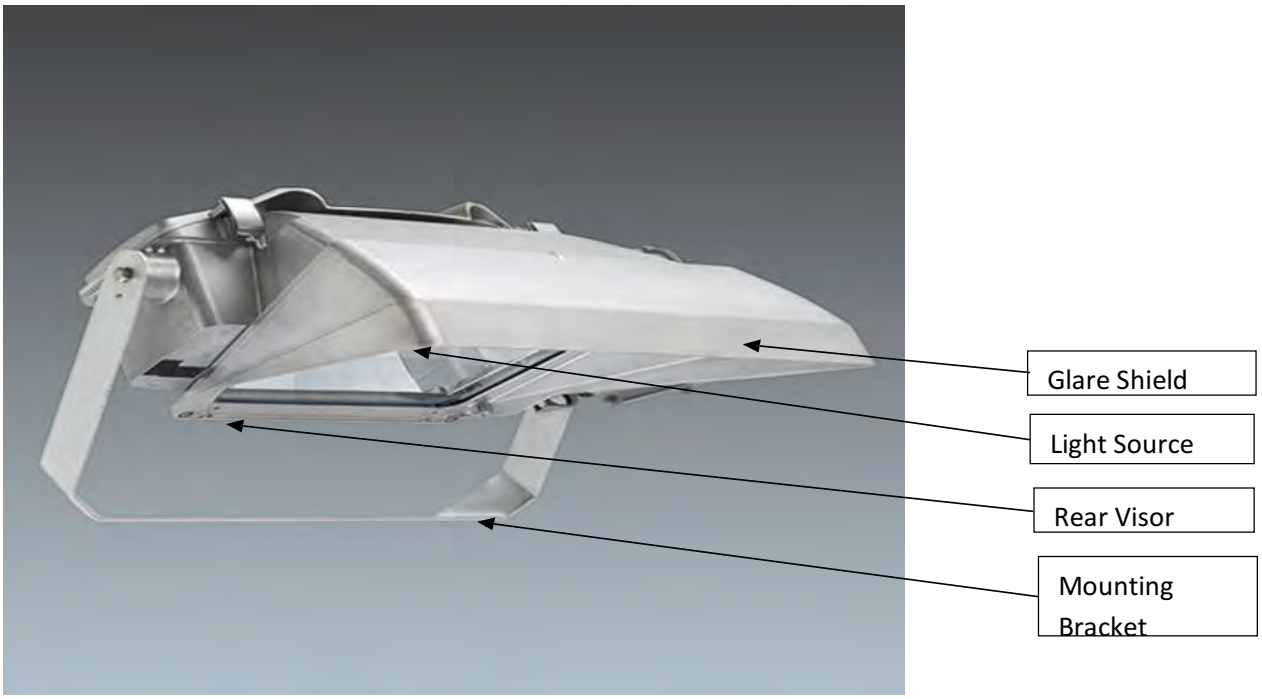


Image 1 – Thorn Champion 2000W Metal Halide Luminaire

The following images are simulated renders from the lighting design software.

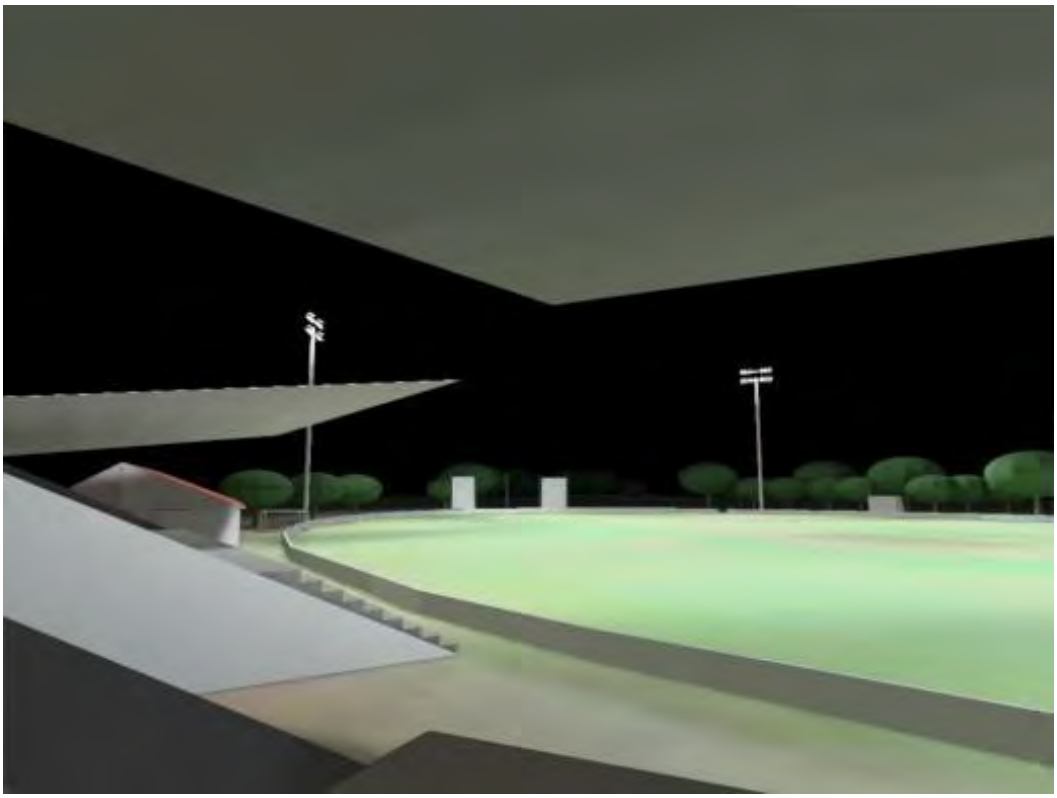


Image 2 – View from Tiger Brennan Stand towards Skycity End Goal Posts (600 Lux)

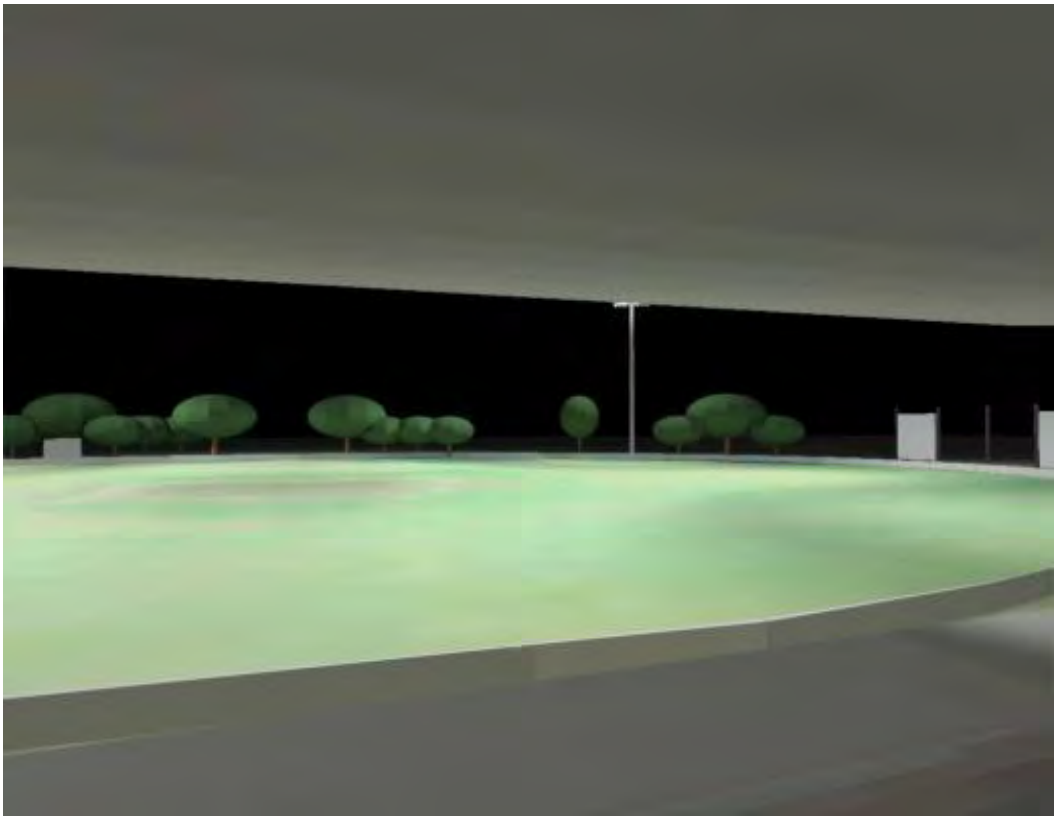


Image 3 View from tiger Brennan Stand towards CBD End Goal Posts (600Lux)

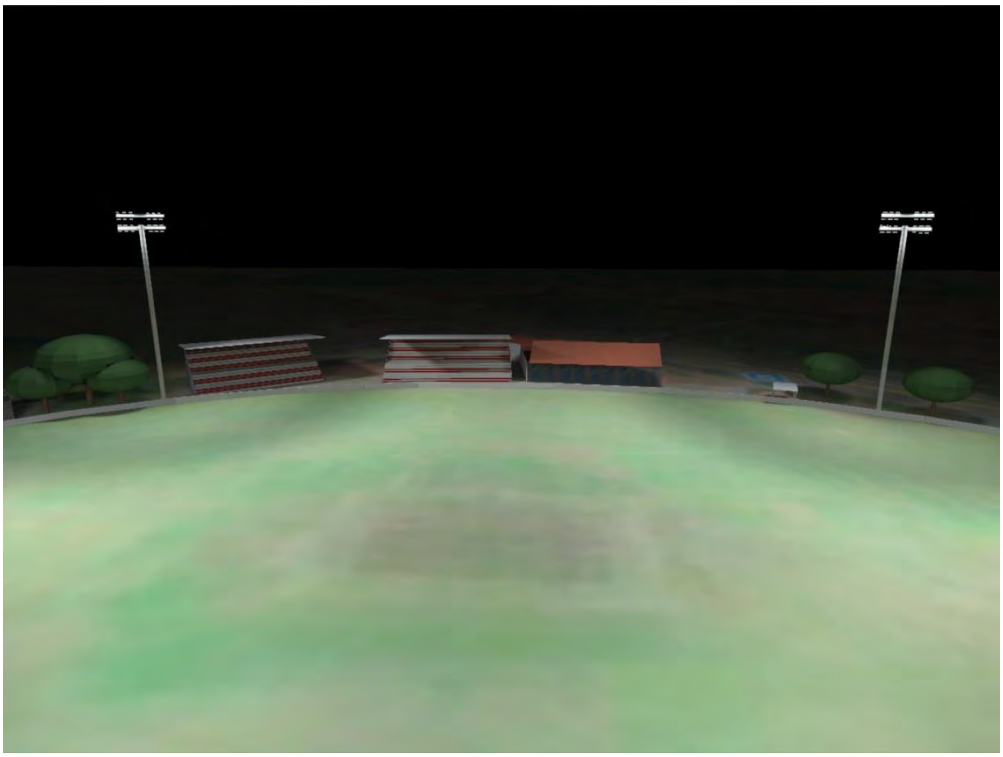


Image 4 – Aerial View from Gardens Road Side of Oval No.1 (600 Lux)

Image 5 – View of Oval No.1 from Gardens Road (600 Lux)

Image 6 – View of Oval No.1 from (approximate) Junction of Gilruth Avenue and Gardens Road

Image 7 – Aerial View

8.0 EXISTING OUTDOOR LIGHTING WITHIN THE VICINITY

A survey of the existing outdoor lighting installations in the vicinity of Gardens Oval was undertaken at 9pm on 10th of May 2017. Lux levels were recorded from the existing installations at ground level. The following table outlines the current lux levels.

Table 2

Location	Average Horizontal Illuminance
Gardens Road	8 Lux
Gilruth Avenue	12 Lux
Chin Quan Road	8 Lux
Gardens Tennis Courts	160 Lux

The recorded existing lux levels were modelled with the proposed sports lighting system to provide an indication of the overall view and impact the sports lighting system will have on the area.

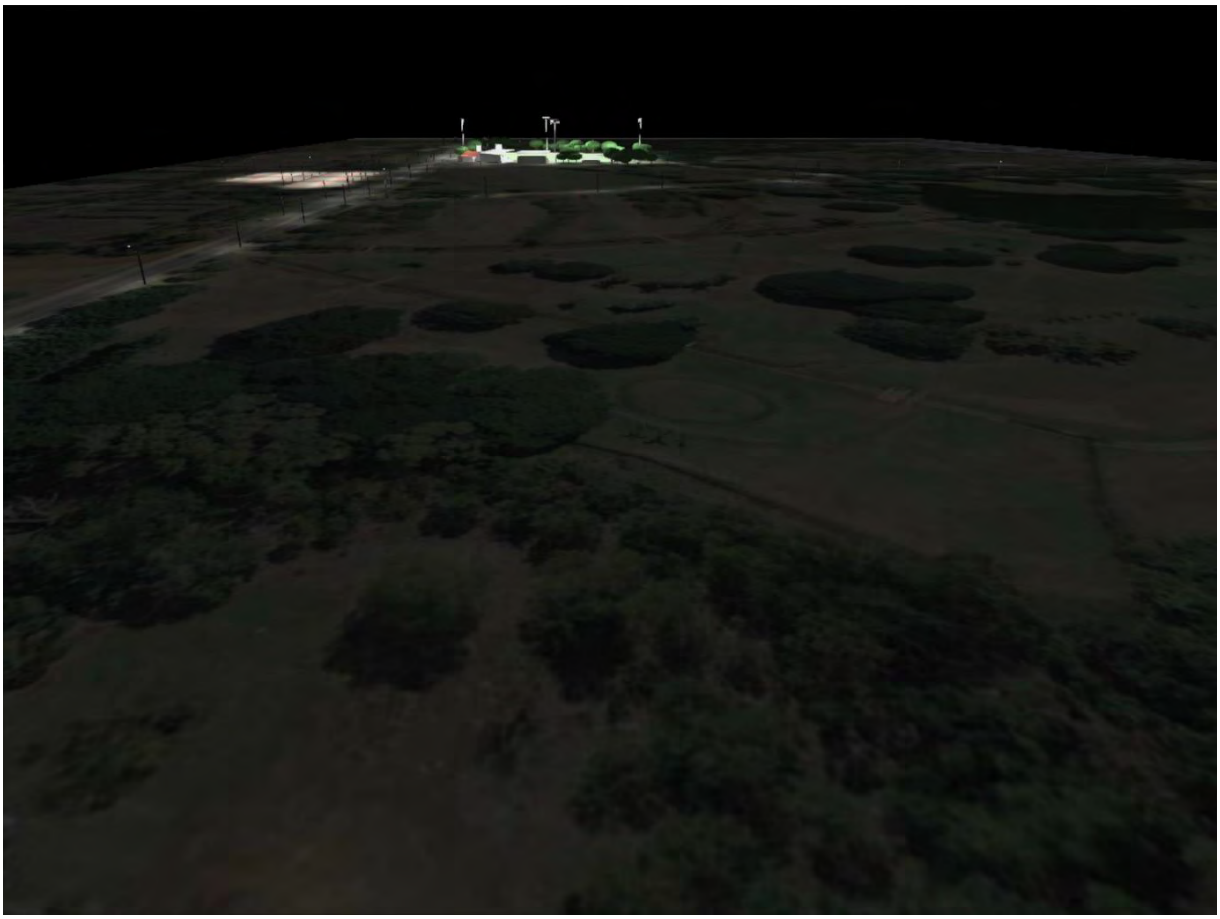


Image 8 – View of Existing and Proposed Lighting Systems from (approximate) Smith Street (600 Lux)

Refer also to the artists impressions and Luminaire manufacturers calculations in the attachments section for further images.

HOURS OF OPERATION

AFLNT and NT Cricket have given preliminary advice regarding the frequency and duration the sports lighting system would potentially be used for a typical week as follows:

Table 3

AFL – Hours of Operation (Wet Season)

Lux	Day						
	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
	6pm to 9pm	6pm to 9pm	6pm to 9pm	6pm to 9pm	6pm to 9pm	6pm to 9pm	Not in Use
	100 Lux (training)	100 Lux (training)	100 Lux (training)	100 Lux (training)	100 Lux (training)	300 Lux (match)	0 Lux

Table 4

Cricket – Hours of Operation (Dry Season)

Lux	Day						
	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
	6pm to 9pm	6pm to 9pm	6pm to 9pm	6pm to 9pm	6pm to 9pm	Not in Use	Not in Use
	100 Lux (training)	100 Lux (training)	100 Lux (training)	100 Lux (training)	600 Lux (match)	0 Lux	0 Lux

A basic lighting control system would be installed near the clubhouse to enable the new sports lights to be switched to the lux levels for the particular event being undertaken.

A minimum of 3No. switching arrangements is recommended as follows:

100lux for AFL amateur club competition.

300lux for AFL semi-professional competition.

600lux for regional and local level cricket competition.

10.0 COST ESTIMATION

A budget cost estimate has been carried out for the proposed lighting installation, the estimated cost of works is $1,200,000 + GST.

The following items were included in the budget cost estimate;

Light fittings, Lighting Towers, Submains Cabling, Trenching, Structural Footings, Switchboards, Lighting Controls and Labour.

11.0 ATTACHMENTS

Attachment A – extract from AS 2560.2.3

Attachment B – extract from Community Cricket Facility Guidelines

Attachment C – extract from AS 4282 – Control of The Obtrusive Effects of Outdoor Lighting

Attachment D – Site Plan

Attachment E – Thorn Lighting Design and Calculation of the Effects of Obtrusive Light

Attachment F – Luminaire Technical Data Sheet

Attachment G – Light Pole 3D Model

Attachment H – Artists Impression Day time

Attachment J – Artists Impression Night time

TABLE 1

LIGHTING CRITERIA

Level of play	Maintained horizontal illuminance[1,2] E_{mh}	Minimum horizontal uniformities[3]		Maximum glare rating GR_{max}	Minimum colour rendering index $R_{a\,min}$	Maximum uniformity gradient
		U_1	U_2			
Amateur and semi-professional level						
Ball and physical training	50	0.3	N/A	N/A	20	N/A
Club competition and match practice	100	0.5	0.3	50	65	N/A
Semi-professional competition	200	0.6	0.4	50	65[4]	N/A
Professional level						
Ball and physical training	100	0.5	0.3	50	20	N/A
Match practice	200	0.6	0.4	50	65	N/A
Professional competition	500	0.7	0.5	50	65[4]	20% per 5m

1 For the height above the playing surface at which the illuminance is to be measured, refer to Clause 6.3.1.

2 Values of illuminance measured at the time of commissioning an installation (ie: initial or close to) should be higher than the maintained illuminance values (see Clause 6.2)

3 Being ratios, U_1 and U_2 can be calculated with equal accuracy by using either all initial or all maintained values.

4 If future upgrading to a level suitable for television broadcasting is intended or likely, the selection of light sources with $R_a \geq 90$ should be considered.

NOTE: The above values are chosen to be adequate to provide for the safety of the participants and the level of visual tasks anticipated. Factors such as large crowds (e.g. ≥10000) with consequent longer viewing distances, might require higher values to be chosen than initially indicated above.

7 UNIFORMITY OF ILLUMINANCE

7.1 General

As the participants are required to observe the football well above the PPA, the distribution of light across the space above the PPA needs to be reasonably uniform as large variations in illuminance across this space will cause apparent uneven flight of the ball and hence poor judgement by the participants.

This Standard specifies requirements for the uniformity of horizontal illuminance of the PPA only. It sets no requirements for the uniformity of vertical illuminance at any height, however this parameter can be addressed by considering items (a), (b) and (c) of Clause 6.1.

7.2 Determination requirements

Except where specifically stated otherwise in this Standard, determination (by calculation or measurement) of horizontal illuminance uniformity shall be made in accordance with the relevant sections of AS 2560.1.

SECTION 2 Guidance Note 04 Floodlighting

LIGHTING CRITERIA FOR OUTDOOR CRICKET

Lighting Criteria for Non-televised Matches

HORIZONTAL ILLUMINANCE (MAINTAINED)*						
CLASS	SQUARE			OUTFIELD		
	AVERAGE LUX	UNIFORMITIES		AVERAGE LUX	UNIFORMITIES	
		Emin/Eave, U1	Emin/Emax, U2		Emin/Eave, U1	Emin/Emax, U2
I	750	0.7	0.5	500	0.5	0.4
II	500	0.7	0.5	300	0.5	0.4
III	300	0.5	0.5	200	0.3	0.3
MINIMUM COLOUR RENDERING, RA8			MAXIMUM UNIFORMITY GRADIENT, UG		MAXIMUM GLARE RATING, GR	
>65; preferable** >90			20% per 5m		50†	

* *Values of illuminance measured at the time of commissioning an installation (i.e. "day one") should be greater than the maintained illuminance values shown above – see maintenance clause. A nominal maintenance factor of 0.8 is recommended, the initial values will therefore be 1.25 times the values shown in the tables.*

** *If future upgrading to a level suitable for television broadcasting is intended or likely; the selection of light sources with CRI Ra≥90 should be considered.*

† *GR should be ≤40 for each batsman in direction of view towards the opposite wicket.*

Source: IESANZ Lighting Guide for Outdoor Cricket LG - 4.01 : Table 1

Lighting Criteria for Cricket Training and Match Practice

LEVEL OF PLAY	AVERAGE HORIZONTAL ILLUMINANCE (MAINTAINED), LUX	UNIFORMITIES		MINIMUM COLOUR RENDERING, Ra8	MINIMUM GLARE RATING, GR
		Emin/Eave, U1	Emin/Emax, U2		
Match practice	200	0.6	0.4	65	50
Non-body contact training*	100	0.5	0.3	65	50

* *Ball training and physical training: non-body contact only.*

Source: IESANZ Lighting Guide for Outdoor Cricket LG - 4.01 : Table 3.

Refer to *IESANZ Lighting Guide for Outdoor Cricket LG - 4.01* for guidance for International and Domestic / First Class matches which are likely to involve cricket at the professional level and cater for televised matches.

TABLE 2.1

RECOMMENDED MAXIMUM VALUES OF LIGHT TECHNICAL PARAMETERS FOR THE CONTROL OF OBTRUSIVE LIGHT

(See Clause 2.7)

1	2	3	4	5
Light technical parameter	**Application or calculation conditions (see also Figure 2.1 and Section 5)**	**Recommended maximum values**		
		In commercial areas or at boundary of commercial and residential areas*	**Residential areas**	
			Light surrounds†	**Dark surrounds‡**
Illuminance in vertical plane (E_v)	*Pre-curfew:* Limits apply at relevant boundaries of nearby residential properties, in a vertical plane parallel to the relevant boundary, to a height commensurate with the height of the potentially affected dwellings. Values given are for the direct component of illuminance	25 lx	10 lx	10 lx
	Curfewed hours: Limits apply in the plane of the windows of habitable rooms of dwellings on nearby residential properties. In the absence of development (i.e. vacant allotment), the limits apply on the potentially affected property, in a vertical plane parallel to the relevant boundary, at the minimum setback permitted for a dwelling, to a height commensurate with land use zoning provisions. Values given are for the direct component of illuminance	4 lx	2 lx	1 lx
Luminous intensity emitted by luminaires (I)	*Pre-curfew:* Limits apply to each luminaire (irrespective of the number on a head frame) in the principal plane, for all angles at and above the control direction, when aimed in accordance with the installation design	Limits as determined from Table 2.2. Alternatively, the limits and method of assessment associated with curfewed hours may be applied, at the discretion of the designer (see Clauses 2.7.1 and 2.7.2)		
	Curfewed hours: Limits apply in directions where views of bright surfaces of luminaires are likely to be troublesome to residents, from positions where such views are likely to be maintained, i.e. not where momentary or short-term viewing is involved	2 500 cd	1 000 cd	500 cd
Threshold increment (TI)	Limits apply at all times where users of transport systems are subject to a reduction in the ability to see essential information. Values given are for relevant positions and viewing directions in the path of travel	20% based on adaptation luminance ($\bar{L}$) of 10 cd/m^2	20% based on adaptation luminance ($\bar{L}$) of 1 cd/m^2	20% based on adaptation luminance ($\bar{L}$) of 0.1 cd/m^2

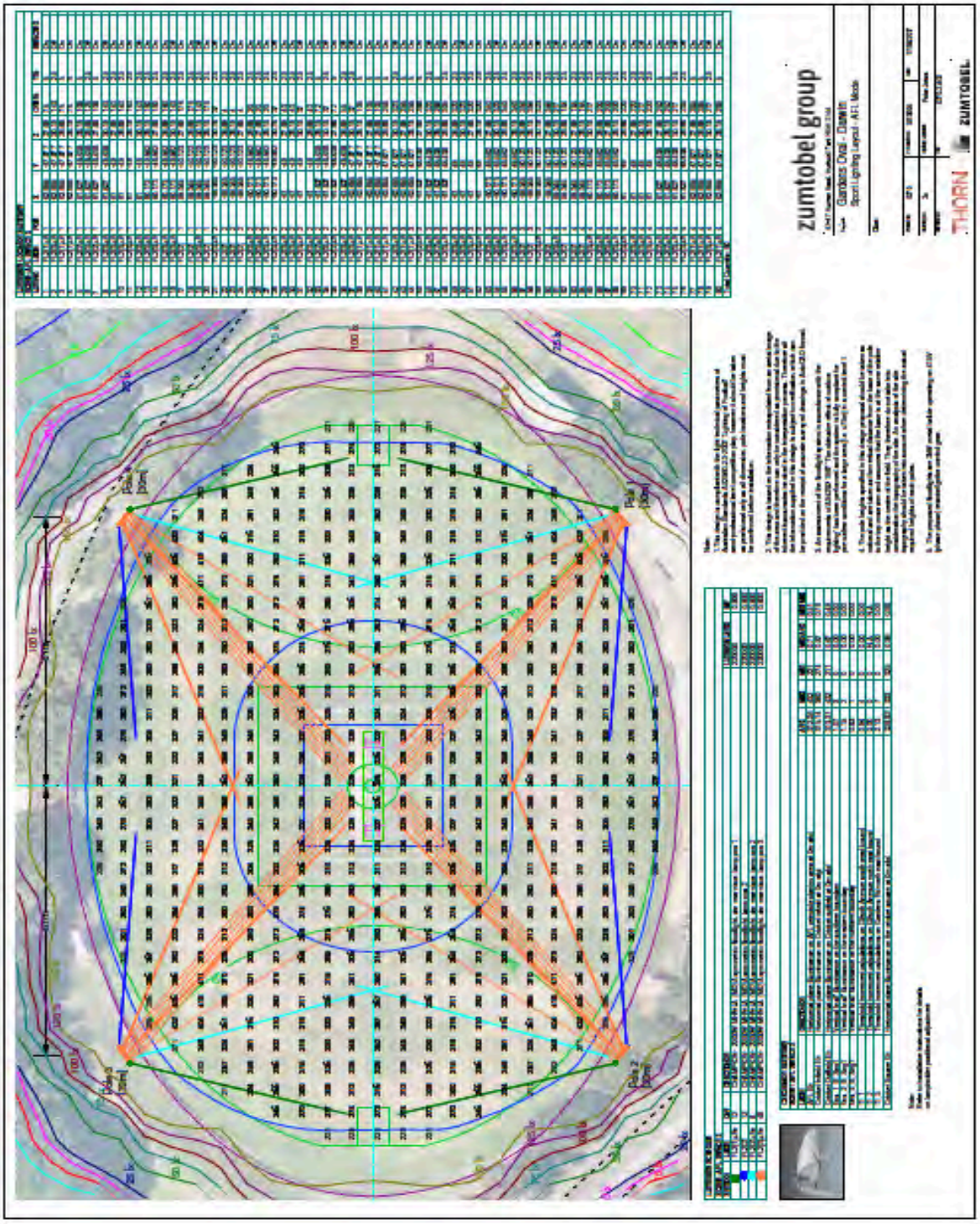
* Applies to residential accommodation in commercial areas or at the boundary between commercial and residential areas. The term 'commercial' is used as a generic description for zoning which provides for urban uses other than residential.

† Where the affected property abuts roads that are lit to Category V5 or higher in accordance with AS/NZS 1158.1.1.

‡ Where the affected property abuts roads that are lit to Category P1 or lower in accordance with AS 1158.1, or where there is no lighting.

Attachment D

Attachment E – 1 – Thorn Lighting Design and Calculation of the Effects of Obtrusive Light



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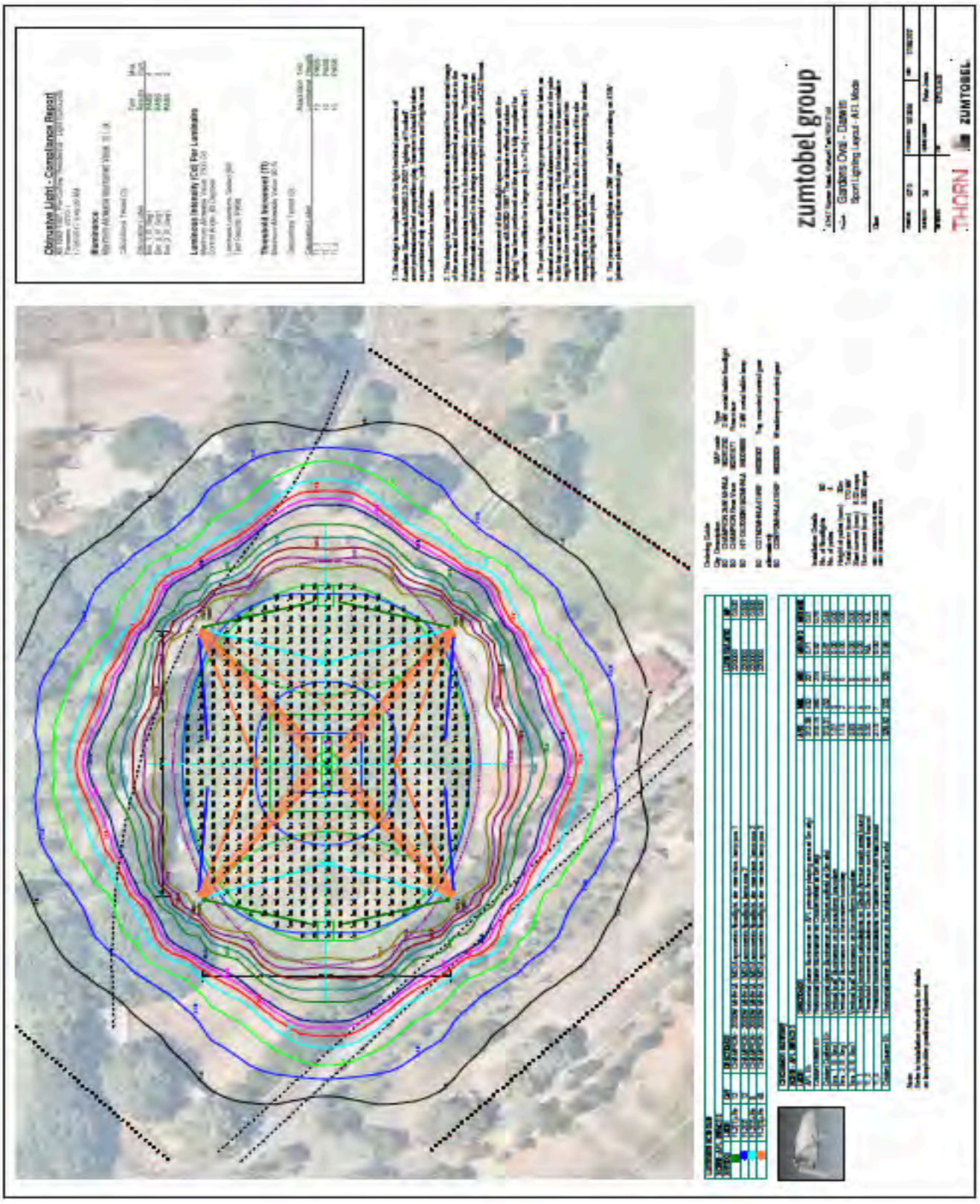
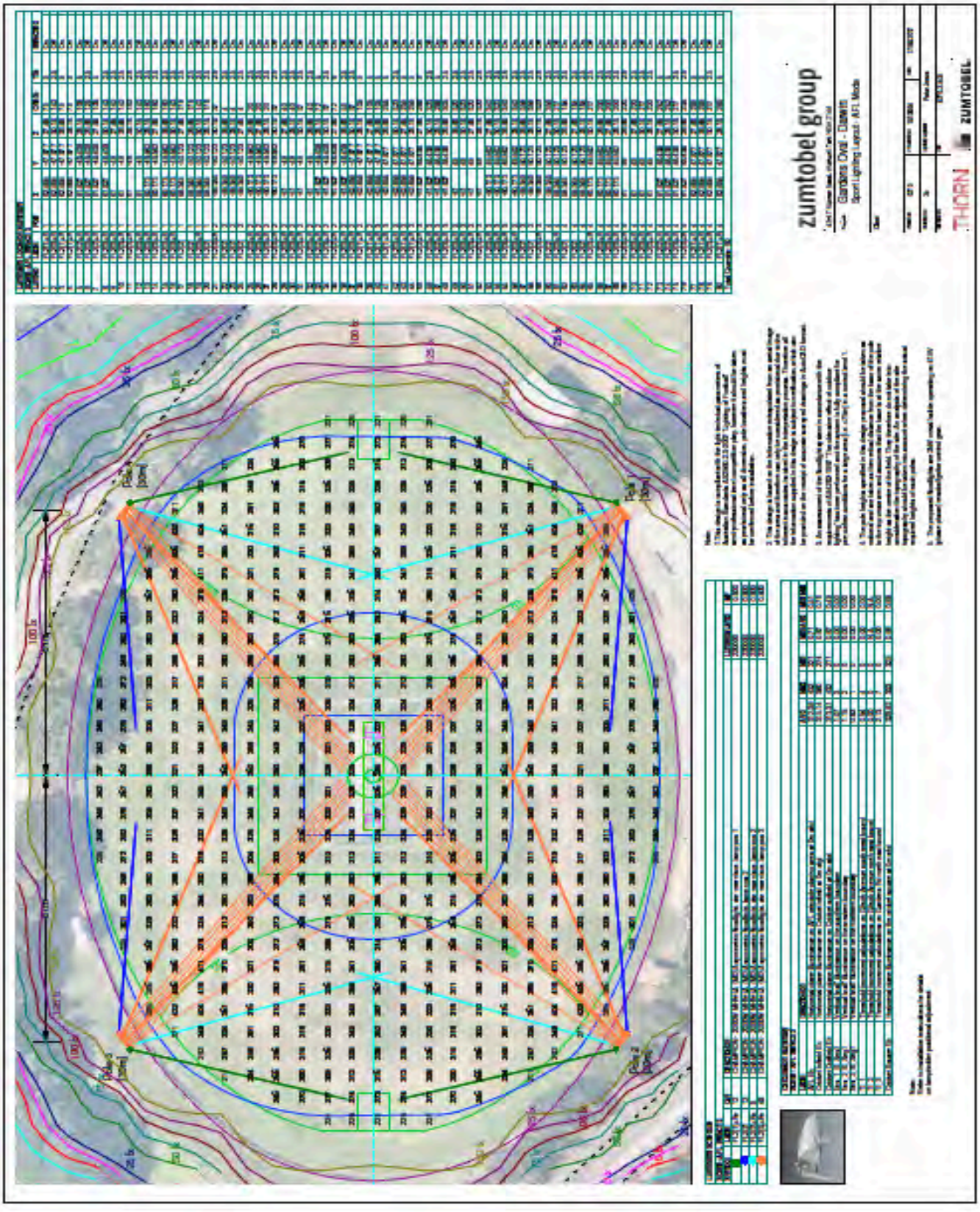
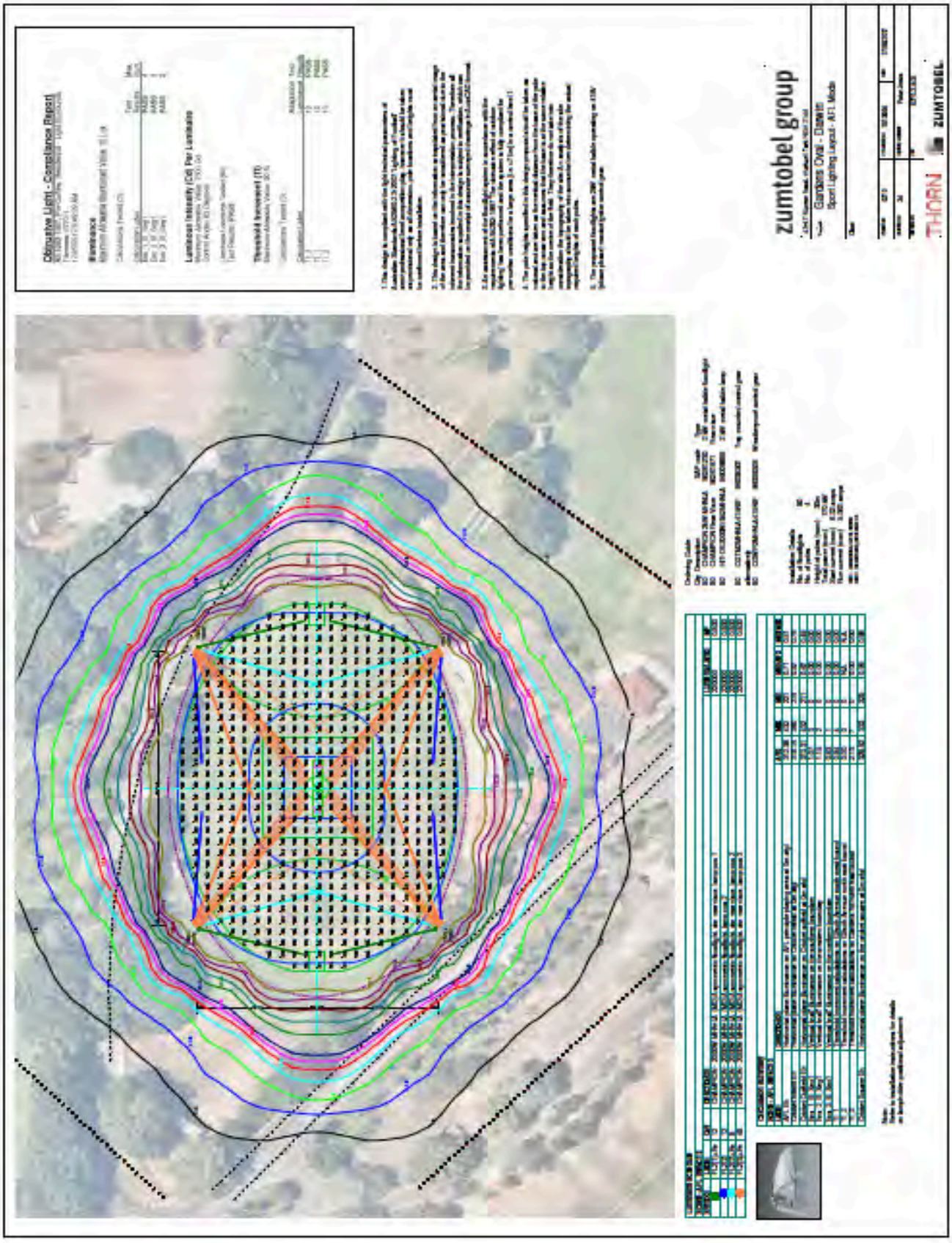


Attachment E - 3



Attachment E - 4



Attachment F – Luminaire Technical Data Sheet

Champion

96261232 CHAMPION 2KW HQITSL CL2 WI

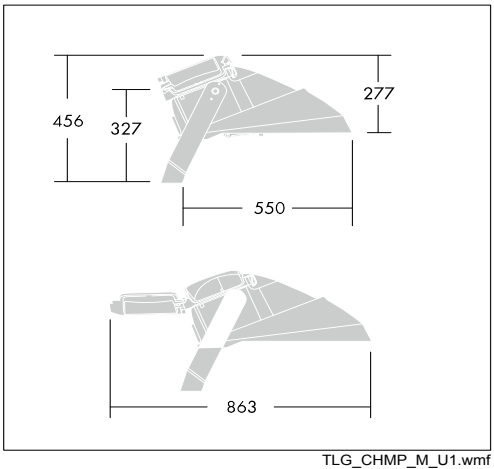
Cable	2000W HIT-DE OSL	IP66	IK08		

Champion

A high performance asymmetrical discharge floodlight for 1 x 2000W HIT-DE OSL lamp. magnetic. Class II electrical, IP66 optical and gear compartment, IK08. Body: unpainted die-cast aluminium. Enclosure: 4mm toughened flat glass. Luminaire fixed by single bolt through Ø22mm central hole, or twins bolts through Ø15mm holes at 100mm centres. Cable gland for Ø7.5 to 13mm cable. Aiming via integrated sights. Ideal for sports field and stadium lighting. Complete with ignitor. Gear tray to be ordered separately. Lamp to be ordered separately.

Total power: 2075 W
Dimensions: 598 x 720 x 448 mm
Weight: 18.9 kg
Scx: 0.185 m²

TLG_CHMP_F_PDB.jpg



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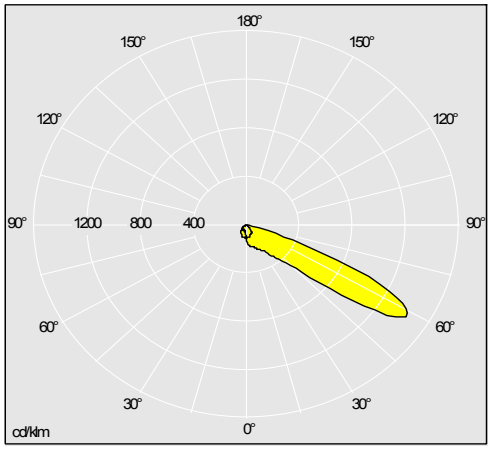


TLLA_C22L2B.ldt

Lamp position: V2
Light Source: 1 x HIT-DE OSL / 2000W
Luminaire luminous flux*: 163680 lm
Lamp luminous flux: 1 x 220000 lm
LOR: 0,74 ULOR: 0,00 DLOR: 0,74

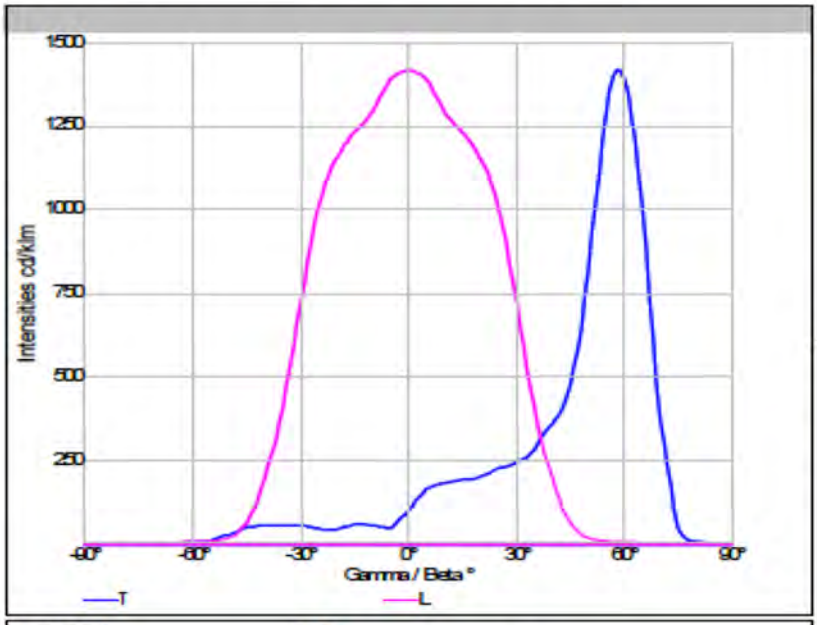
Luminaire efficacy*: 79 lm/W
Lamp efficacy: 106 lm/W
Ballast: 1x MAG
Luminaire input power*: 2075 W Lambda = 0.98

All values marked with an * are rated values. Unless stated otherwise, the values apply to an ambient temperature of 25°C.

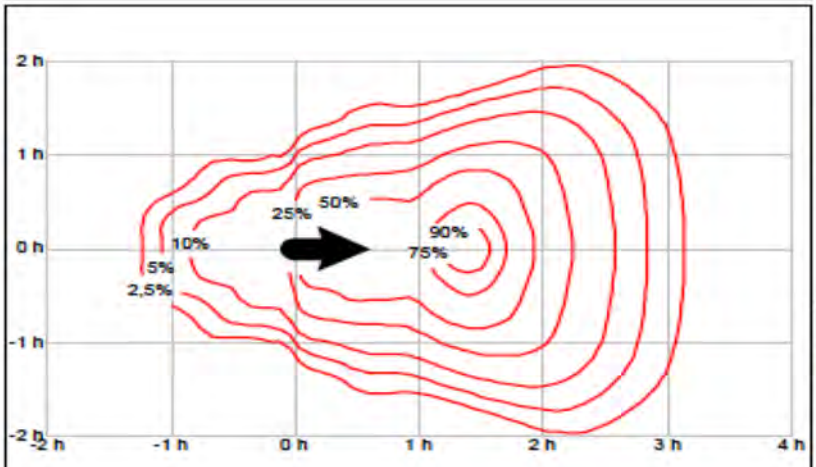
Champion

96261232 CHAMPION 2KW HQITSL CL2 WI

THORN



Measurement	C22L2B
Catalogue number	CHAMPION2KWHQITSLCL2WI-V2
Lamps	1 x 2000WHIT-DE
Lamp adjustment	
IP	

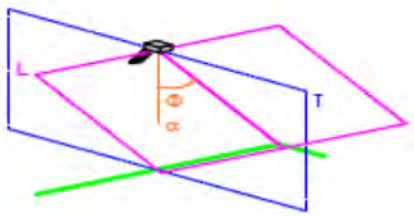


$$E\ (lux) = \frac{Emax \times E\% \times F}{h^2 \times 1000}$$

Emax = 243,9 / m / klm
luminous flux for the chosen lamp (lm)
Mounting height (m)

Luminaire design attitude

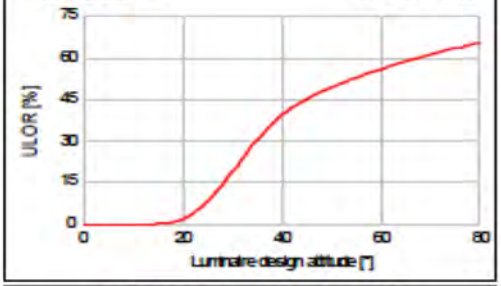
Tilt: α = 0.0 °



Maximum intensity	
Imax	1423 cd/klm
Θ	58°
Beam factor to 10% peak intensity	0.86
Beam divergence	
at 50% of Imax	
Longitudinal	2x 30.2°
Transverse:	48.8° / 67.3°
at 10% of Imax	
Longitudinal	2x 41.6°
Transverse:	33° / 73.4°
Light Output Ratio	
Luminaire design attitude	0.0°
LOR	74.00
ULOR	0.00
DLOR	74.00

Upward light output ratio

3% for a tilt = 21°	5% for a tilt = 23°
10% for a tilt = 26°	15% for a tilt = 28°
20% for a tilt = 30°	25% for a tilt = 33°



Glare restriction Obtrusive light

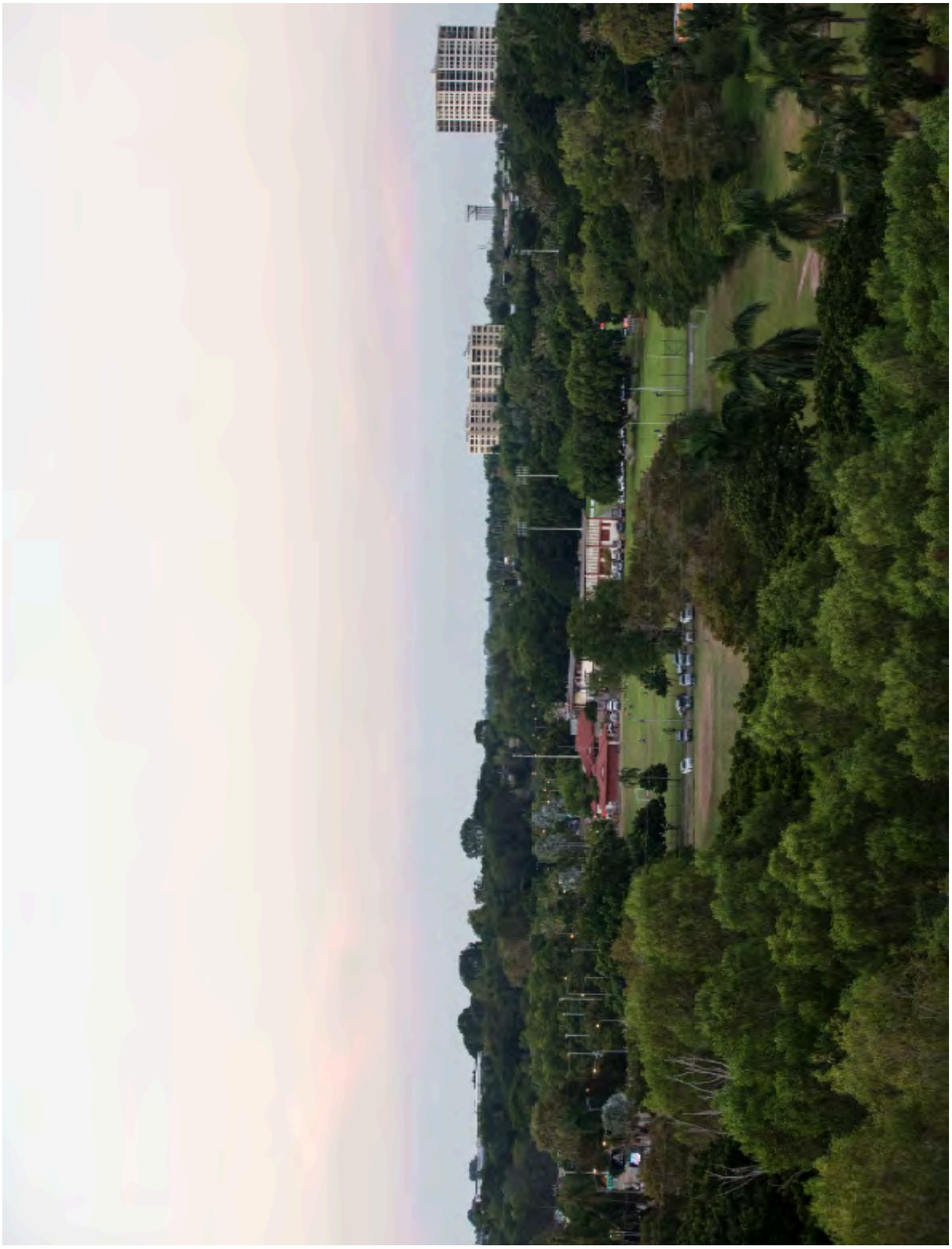
Luminous intensity class G4

γ	Meas. Data Imax in cd/klm	Specified in EN 13201-2
70°	498	500
80°	9	100
90°	0	10
>95°	0	0

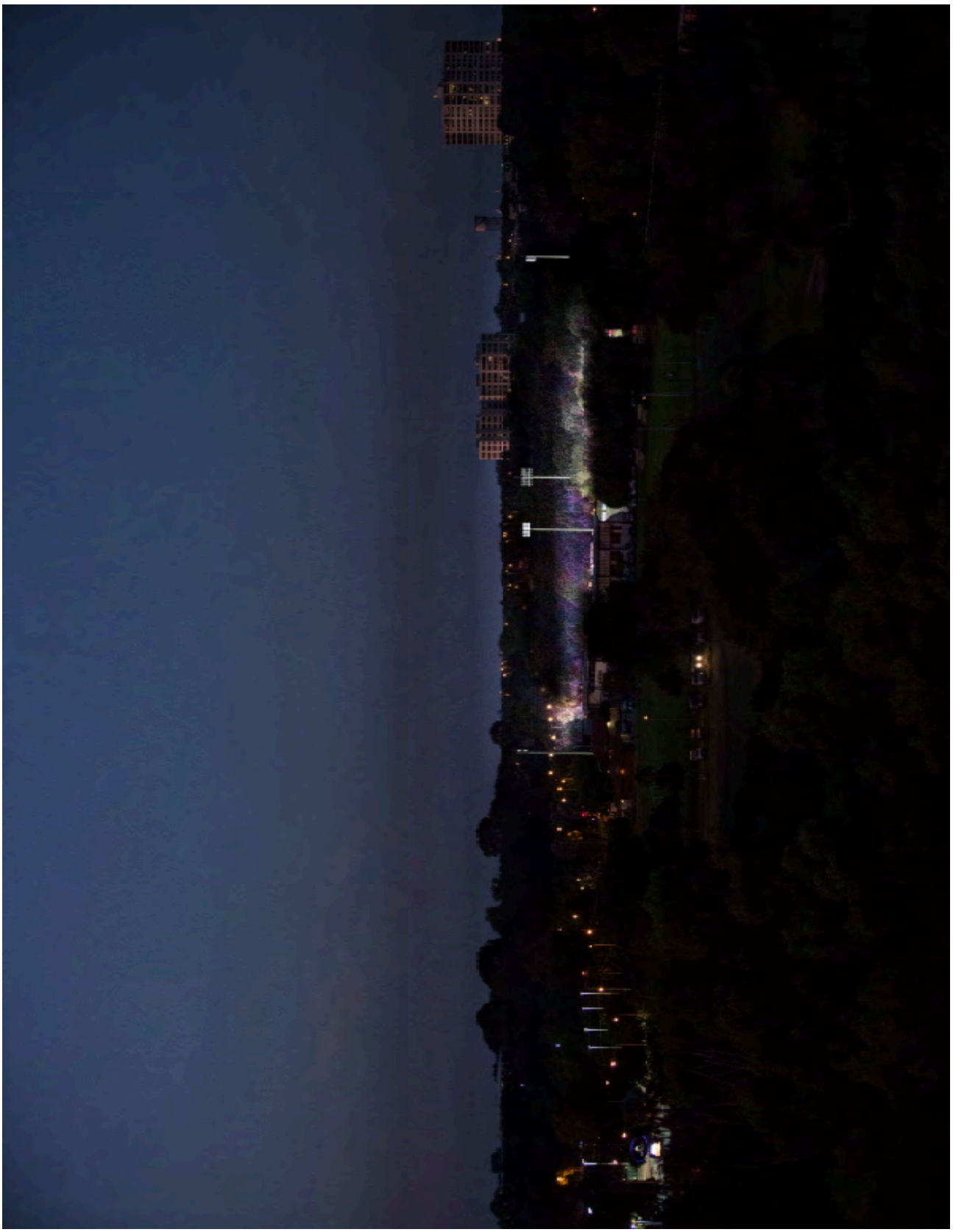
Photometric data file: TLLA_C22L2B.idt

Attachment G – Light Pole 3D Model

Appendis H – Artists Impression Day Time



Appendix J – Artist's Impression Night Time



APPENDIX 2 - SURVEY DATA REPORT

Q1 Where do you live?		
Response	**Response count**	**Response per cent**
Darwin CBD / Waterfront / Larrakeyah / Cullen Bay	67	17.09%
The Gardens	25	6.38%
Parap / Fannie Bay	60	15.31%
Stuart Park / Bayview / Woolner	45	11.48%
Northern Suburbs	126	32.14%
Palmerston	37	9.44%
Rural	10	2.55%
Other (please specify)	22	5.61%
answered question	392	
skipped question	0	

Q2 How long have you lived in the Northern Territory?		
Response	**Response count**	**Response per cent**
Less than one (1) year	16	4.10%
One to five (5) years	83	21.28%
Five (5) to ten (10) years	69	17.69%
More than ten (10) years	222	56.92%
answered question	390	
skipped question	2	

Q3 Male or female?		
Response	**Response count**	**Response per cent**
Male	245	62.82%
Female	145	37.18%
answered question	390	
skipped question	2	

Q4 Age?		
Response	**Response count**	**Response per cent**

Under 18	22	5.64%
19 to 30	125	32.05%
31 to 45	128	32.82%
46 to 60	90	23.08%
Over 60	25	6.41%
answered question	**390**	
skipped question	**2**	

Q5 Do you (or your family) use or visit Gardens Oval?		
Response	**Response count**	**Response per cent**
Yes	353	90.28%
No (go to Q10)	38	9.72%
answered question	**391**	
skipped question	**1**	

Q6 If you (or your family) use or visit Gardens Oval, how often do you?		
Response	**Response count**	**Response per cent**
Often (more than once a week)	110	31.07%
Regularly (once a week)	74	20.90%
Occasionally (once every two or three weeks)	80	22.60%
Sometimes (once every few months)	57	16.10%
Rarely (once or twice a year)	33	9.32%
answered question	**354**	
skipped question	**38**	

Q7 Why do you (or your family) use or visit Gardens Oval?		
Response	**Response count**	**Response per cent**
NTFL player	191	53.80%
Cricket player	83	23.38%
NTFL spectator	225	63.38%
Cricket spectator	100	28.17%
NTFL coach or other	56	15.77%
Cricket coach or other	23	6.48%
Other (please specify)	45	12.68%

answered question	**355**	
skipped question	**37**	
Other - responses		
Special events spectator		
Softball player		
husband and kids sports		
Don't		
Walking and softball training		
Softball player		
SOFTBALL training grounds and got personal use		
Soccer		
Events at the club		
partner plays for tahs		
volunteer		
Auskick Sessions		
Community events		
Work		
NTFL Official		
Kick the footy		
Cancer council walk		
Football		
Community events (last time was relay for life)		
Community person		
Local resident		
Soccer		
Kick footy		
Son is a player		
Also involved with Port Darwin soccer club which uses Gardens for training and games		
Walking		
exercise		
NTFL Umpire		
Clubhouse used as venue for events of other associations		
eventsn such as cancer council, adjacent ovals for soccer		
NTFL umpire		

Both Kids play footy for Tahs and train twice a week
Recreational footballer
Home overlooks Gardens Oval
Multiple reasons
Also with Port Darwin Football Club and use the facilities for soccer
Soccer
Soccer
NTAFL team official
Soccer
WaratahFC Volunteer
Waratah supporter
Short cut to bus stop
player and volunteers at Waratah Football Club
relay for life

Q8 What do you currently like about Gardens Oval? **315 *answered question*** **77 *skipped question***
Responses
Everything
The location and the facilities
Close to where i live. Always looks nice.
It is such a beautiful location, surrounded by fabulous gardens.
It's aesthetically beautiful, surrounded by beautiful trees, with a nice intimate atmosphere for watching events.
Great location and great facilities
Setting so close to the City and Botanic Gardens
great atmosphere...convenient to city and northern suburbs
most beautiful sporting field in the NT
there is a great oval in the city
It has so much history to many. I grew up going to this oval and now my kids are using it too. Its great for Darwin to grow with times and adding lights is a fantastic idea to grow local sports and events.
When it is quiet. Open space. Parkland.
the ground

Nice green and well maintained community amenity
location, quality of ground
Location, grandstand under cover, parking
It's central and parking is good
Famil friendly atmosphere
The location and the well kept grounds
History of ntfl and atmosphere. Family friendly environment. Oval is in good condition
one of the most scenic and well kept ovals in Australia
Great facilities for playing - good playing surface, grandstands for seats and shade, and a good clubhouse with bar and beer garden. Great location also.
Good ground to play on with a great grad stand , also very nice location
It's a beautiful oval, great for spectating and playing.
Beautiful setting. Close to and engaged with the CBD, tennis & golf making it a city focussed sporting hub
Location
BEAUTIFUL
Location, "atmosphere", playing surface. This is an iconic Darwin recreation facility and installing quality/appropriate lighting would be a highlight for Darwin's sporting groups and the wider community. Downside? More patrons = facility upgrades = $$$$
One of best oval in Darwin/NT. It is picturesque and in a great location.
Location, set out and history
Gardens Oval is a matter of Pride for Darwin, given its central location, lush surroundings, facilities and high connectivity from throughout the city.
The grandstand and clubrooms
Proximity
It is the show piece oval for Darwin and encourages people to play or watch sport as they drive past and see people actively playing on very well maintained grounds. It holds a legacy of history and sentiment for Territorians past, present and future who have played at Warratahs. The facilities display this character with a blend of old and new.
I just love playing footy
Good location, good facilities, good sporting clubs
Location. Great sporting venue. Good facilities. As a spectator enjoy the atmosphere..
Aesthetics - it's a pretty little oval.
This is an iconic grounds. Having lights would provide more opportunities for further sporting and social events. There has always been something special about this ground; having lights would add an extra charm.
Outstanding facility except for one factor. No lights
Excellent facilities for cricket

Access, parking, facilities, plenty of seating
Beautiful surroundings with a local club feel
The grass is always in great condition.
Gardens Oval is one of the most versatile sporting ovals in Darwin. In can cater for so many sports such as soccer, softball, cricket and football to name a few. The grounds are established and would certainly get more use with access to lighting.
Perfect position, great grand stand
It's History, it's a beautiful oval, close the city
Relaxed atmosphere, family friendly, grea sporting facility.
Well kept oval
Sea breezes, big trees. Home of the Tahs.
It's very picturesque and the club is great.
Location
Great location, great playing surface, ideal junior footy oval
Location and and having the gardens next door
Shade
Proximity. Prettiness
Nice small oval with good grass
It is a beautiful facility
The main oval is magnificent. I love the cricket and junior AFL club.
Excellent venue surrounded. Y the gardens
Central to Darwin city, ease of access
Gardens Oval is a fantastic ground. To see it under lights would open evening/night sports to be held there.
Picturesque; The atmosphere it provides to spectactors (close to the action),
community sport
Close to CBD
Great surroundings (picturesque), great spot, great oval, great facilities
Old Darwin feel relaxed atmosphere
The location and atmosphere
One of the best grounds to train and play football on. Great location.
It's in a great location
Great surface and great facilities
It's the best oval in the NT. Great location and fantastic setting
The ambience

Set up in a good spot and a great facility for sport. Great footy oval
Its well maintained close to home
Location.
Main oval
it is the best setting for sport in darwin
Good atmosphere
Central ground
Picturesque, great atmosphere, has character & an aura. Love training, playing & watching there.
Location, atmosphere, seating, facilities
The location and the scenery. Surrounded by the gardens and close to the ocean, allowing a nice breeze.
Its open feel and proximity to the city.
The setting
Close to Casino, city and restaurant precinct. Also great atmosphere
Great location
Location Greenery
It's position in the area
Great facilities, close to the city
Location, surface, atmosphere
Proximity to the city/mindil beach. Good parking. Great oval to play on.
Everything. Area access scenery
The Grandstand for the main oval
Neat, tidy. Great oval
Playing surface is fantastic. Great position next to the water at Mindl.
Best ground surface and close to the city
Good location an great atmosphere
One of the best grounds in Darwin
History, accessibility, beauty, quality of facility
It is the best oval in Darwin, it is in best location and should again become the main sporting venu
The setting- could do with more grass mounds round most of the oval
Landscaping, position, grandstands
Location, size of oval, community feel
Location, History, Ambiance

The "home ground" feel it has. Love the clubhouse and how it allows for all club functions and after home games being able to go in there. location is perfect as it is close to the city and the beach.
Great location
The location of the oval is nicely situated near the Casino, Botanical Gardens and Mindel Beach.
It's location, most occasions the oval is in really nice condition. The facilities are great, may need more changerooms though but understandably would be difficult to make happen.
The atmosphere of the ground with tropical background As spectator close to the action
The setting in which is located. The grand stand is a great size for the crowds that attend
Close to home. Good atmosphere.
The grandstand and the facilities
Location
Gardens backdrop and size
Good surface
The ground is good condition.
The Location and the history behind it.
Nice oval, well taken care of. Good spectating areas
Love the nice close atmosphere of NTFL being played there with the right size grandstands.
The layout and location. The stands and visibility.
Relaxing atmosphere
not much
Best surface to play on in the territory
Small ground atmosphere
Great ground close to the city. Awesome for watch footy and under lights would be awesome on Friday nights
The historical significance and the atmosphere
Great location and facility. The grandstand makes it enjoyable to watch football and cricket matches. Lighting to allow for evening games would improve the experience for players, volunteers and spectators.
The location, situated right on mindil beach and close to the city. Great location.
Smaller ground - closer to games
Traditional
The beer being sold.
The nice field size and the grass
The area it's in
Asthetically pleasing and great location. Plenty of parking too.
The location

Great views, great playing surface
Great stadium and ground surface.
The atmosphere, iconic and open location.
That Its got a good atmosphere to play on
The beautiful setting in between the botanical gardens and mindl beach
It's a lovely cricket ground with great facilities
The Backdrop and the history of the Ground
It's a beautiful ground and has a fabulous atmosphere
Great oval
close to town, great oval for footy and cricket due to size and high quality playing surface. Great club rooms. Plenty of parking.
Good oval
It's location. Always has a nice sea breeze
It is the most iconic sporting venue in the Northern Territory and the spiritual home for NT Footy. It has a lot of charm and has so much potential and is currently under utilised.
Great ground, always in great condition and a great sized oval to play on.
Location. Tropical feel, proximity to sea.
The condition of the lawn, the new club rooms, the grand stand, the location
Best location for footy and cricket in darwin
It's is a relaxed and "pretty" space
Historic
Atmosphere
Fantastic location
Location, environment , tradition
The local football club vibe and feel and sitting in the club watching sport is fantastic
Nice oval, good ground cover
Beauty, location
Great oval in a gray locstion
Traditional ground and beautiful scenery
The size of the ground.
Location. Close to CBD. Beautiful setting.
Love the ground and the stands. Needs to be used much more
It's a great 'old school' darwin oval
The grounds the clubsrooms the stands

Location and bar/restaurant facilities
the space is green it brings sporting events into Darwin also the club is as old as Darwin and should be cherished
Nice grounds, good stands area, good parking, fenced, nice space for off grass activities.
Location, great ground to watch footy. TIO is stale and it's far better supporting local footy teams than the Ntfl organisation. Suburban grounds should get used more often. At night when slightly cooler would be better and provide a lot more flexibility in scheduling matches throughout all divisions
It is beautiful
That's it a peaceful and iconic setting for Territory sports.
Nothing shit Field
It is a beautiful setting with open areas and botanical gardens close by
Beautiful big Shady trees & proximity (close) to Botanical Gardens and CBD. Darwin needs a high end sporting facility near the CBD to attract sporting events that travelers and tourists can access easily, close to accommodation and amenities.
Location
It's ability to blend into the local landscape without taking away from the ambience of the immediate region.
Vicinity to the city/mindil/casino. Good atmosphere watching sports as its close to the action/boundary
Nice sized venue for NTFL/Cricket matches. Great atmosphere.
I like the condition the ground is in, it's magnificent to play both cricket and AFL on and would be amazing being able to play night time games as well
Great atmosphere Even better with lights for night games
Local
it's local & a great heritage
Convenient location and easy access
How close it is to the city and how greatly we'll looked after and designed the oval is.
central to everything
Location
The heritage. The location. It's fantastic having the oval in amongst the city.
Close to the city, nice sea breeze for Sunday arvo games.
Location
It is the best oval in Darwin, picturesque setting and perfect location
Close proximity to the city, the atmosphere at football matches.
Pretty oval
Location

Close proximity to city
Location. Perfect spot. In the heart of our town.
Th atmosphere and the sexy boys
It's home to the tahs and it's got a good atmosphere
The atmosphere
Great atmosphere and loads of history.
It's convenient location and beautiful structures
Proximity to the city and beautiful sunsets
Close to CBD
Amenities, location, setting, facilities
Such a nice looking area, close to Darwin! No better place in nt to watch footy!
The scenery that surrounds the oval
Incredibly scenic oval love it
Location. Football club
Beautiful ground
Location, venue, atmosphere
The tradition of the clubhouse and the good seats
Locality Surface Surroundings
Location
Location
Great atmosphere
Central location, also close to Mindal beach.
Position in town , club rooms, oval conditions
It's a beautiful oval with good stands and clubrooms
Picturesque , central to the heart of Darwin, great history of the ground (formerly the home of NTFL), great place to watch cricket
Picturesque and in a perfect position to be an developed into an iconic stadium. Gets as good a breeze as anywhere in Darwin, accessible from 3 directions, plenty of parking.
It is the best oval in the NT
Its proximity to the CBD & its beauty
It is a beautiful oval and considered by many to be the premier venue for watching both cricket and AFL.
Love everything about it
The large area of green on the fringe of the CBD, and the bird life

Great location, excellent facility to watch the football in - plenty of breeze and well shaded
The size of the ground, the condition the ground is in all the time and the nice seaside experience scenery.
Location and setting amongst botanical gardens and beach Home of the Waratahs
community open space that is and should continue to be used for thegreater public benefit
Open green space, beautiful trees and a special community gathering place. It's an integral part of The Gardens.
Location, ground quality
It's accessiblity in a beautiful part of town
Facilities and ease from which to watch sport
Great Ground with good facilities. I train there and play there regularly during the wet season.
its size
Trees.
It is central and is a great playing surface. The setting is fantastic also with the trees and the stands.
Location, sea breeze, general feel
Excellent venue and atmosphere.
Great location that provides wonderful atmosphere
I love that the gardens oval has a real local community feel. When I first walked in the gates I felt the history and loved seeing how welcome everyone was. It is a real community facility.
The big trees and the history
Close to city
Location, two ovals available, clubrooms, plenty of parking, good oval drainage
Location The grounds
It's a great oval, great grandstand and hill to watch the football from.
Best ground in darwin
Proximity to city.
Family friendly
Traditional local footy (esp) oval, a community ground
terrific community space, well used, one of the most attractive district ovals I have seen, proximity to the Botanic Gardens adds to the overall aesthetic appeal of Gardens Oval, with large trees and "village green" feel to the grandstand and facilities. Always uplifting to drive/walk/ cycle past and see sport being played and watched at this fabulous venue.
User friendly sporting facility in a picturesq location close to Mindil Beach.
Its tranquility and picturesque nature.
It is very picturesque and surrounded by lovely trees, and the Grandstand is quaint. It is also close to Mindil Beach, The Botanic Gardens.

A great atmosphere. Great location.
Location, grandstand, quality cricket club,
That it is within the last original major green zone within the Darwin CBD - apart from the Esplanade
Spectator stand is well oriented to the field. Access all around the field as an official is good. The shade of oval 2 is fantastic.
It's picturesque setting and the idyllic backdrop
The location and how good the oval is
Central. Close to home. Beautiful surroundings.
Only inner suburb oval. Easy parking. Used by lots of clubs so has a lot of community involvement.
Location
Location and spectator facilities
Location
It's a central based oval that its absolute quality. I grew up playing on and used to be the home for the NTFL. The club house is class also, had my 21st birthday there
Location
Airconned bar!
Beautiful atmosphere, good facilities,
The look of the Oval amongst the trees and it's proximity to the city
It's a beautiful oval right in the heart of Darwin. Sport is such a huge part of the territory and gardens can really bring it to life.
Clean and pleasant facilities.
Location, convenience, level of maintenance.
It's in a good area and has a nice field for footy
Lovely area. Nice sporting grounds
Its better than tio
Location, the club rooms especially the beer it serves.
location,
It is a great oval to play footy
The availability to the general public. Good Grandstand and general seating. Great Clubhouse. Very picturesque and good parking
Its a great ground
The ground and atmosphere
Great Outside sporting arena
The best venue to watch sport in Darwin. Close to city and a nice cool breeze in the wet season for Footy
Oval central to the city, and close to other Darwin attractions like Casino, Mindil Beach and Botanical Gardens.

Reminds me of ny childhood, growing up playing footy there. Love the big trees and beach surrounding also.
Location
Location
Location and facilities
Location
Great atmosphere. Clean.
Great facilities and Aircon club rooms
It's my home ground
Location
The view and atmosphere
The location, facilities, state of the oval.
The clubhouse, location and waratahs
The grandstands
Atmosphere. Beauty. Intimacy
Great location. Great venue to what sport.
It's the best oval in Darwin from a player and spectator, it's Darwin Adelaide oval.
In the city
The location
It's beautiful location and surrounds.
Its location and it is the best AFLNT Club in the league
Proximity to cbd.
Ovals are generally in good condition, it's nice and roomy and the complex has a good atmosphere
location and grandstands
location, oval condition
Oval 1 is good
Local, community feel. Good location.
It's clean and location.
Atmosphere Good ground

Q9 What don't you currently like about Gardens Oval?
298 ***answered question***
94 ***skipped question***
Responses

The possibility of the Blake Street towers
Best ground in Darwin
Nil
nothing
Lack of access to parking. Needs a pedestrian footbridge over Gilruth Avenue. Grandstand seating could do with some refurbishment.
There are no lights. And not enough night time games
n/a
Not used enough
it only can be used at day times
Have to stop when it gets dark
It is ok as is, except the lights from the club house.
the club
proposal for lighting it
only usable during daylight hours
Not used enough due to no lighting for night games, scoreboard on second oval in wrong spot for spectators
Not enough change rooms with AFL becoming a growing sport, especially in the women's division.
Lack of shade around both ovals. The poor state of players dressing rooms. The unbelievable lack of space in the umpire's dressing room!
Changeroom facilities. Needs major upgrades to current changerooms and others installed for oval 2 access
security - too many break ins not enough top line events sheduled there
Break-ins on market days and poor training facilities.
That there are no lights
Daytime only restricts its use.
No lights!
Change Rooms
DAYLIGHT USE ONLY. ROOMS KEEP GETTING BROKEN INTO
It is ok as it is, ie preserve some of the its history and cultural associations. Turning into a mini ampitheatre with tiered seating all around would seriously detract from its present appeal.
Limited opportunity for Juniors (both cricket and AFL) to train beyond 6:30pm as it gets too dark. Also having Juniors games during the day is far too hot and dangerous during the wet season.
Seating

. Direly needs Night lighting to enhance its utility during the late hours, owing to better temperatures during the night, hectic lifestyles and to enable the residents to stay fit & de-stress. . Some shaded sitting space, to be used during the day. . Can consider adding a pedestrian entry from the rear side.
The lighting
Dark at night practice
My son plays long games of cricket for and has skin that burns very easily, even with sun protective clothing its difficult to prevent sunburn. To sit and watch the games can also be hot. Lights at Warratahs will open up sport options to more families in the cool of the evening without damaging sun rays. It will also promote use of the the clubs hospitality arm. It would be a positive step forward for sport in Darwin.
that it's Waratahs home ground
No lights
N/A
Nothing
Lack of lights
The poor state of the cricket nets
Requires lighting to enable sport and a plethora of other activities to be conducted
No lights, meaning when football training is on it is all dependant on day light. A large % of players at our club work until 6 o'clock onwards and miss half of training. If lights were available we could push back the start time of training to 6.15 - 6.30 and all players could train together.
Condition of the practice nets
There are no lights for night time
Limited seating on oval 2
No lights for use after sun set
Need to keep replacing any big trees that are removed. It needs to have big shade trees.
Inability to be used after dark for games and training.
No lights on dusk
Boggyness around oval no 2, no womens changerooms, cant use after dark when its cooler.
No lights
No lights
The club rooms are old and dated and the cricket nets are terrible. I don't think the ground is utilised to its best potential.
No access from Gardens Rd
That there are no lights and change rooms are to small
Not much except the kids and teams need lights!!!

The cricket nets are the worst in Darwin (hopefully they get fixed soon). The clubhouse gets broken into after the markets very regularly - the windows need protection.
Lack of change room facilities, 2 no oval underutilized due to this Lack of lighting
Under utilized by the ntfl, it's a great oval for football games.
I would have to say the level of lighting
The general upkeep of the facility by the council. The clubhouse facility is over 15 years old and not much has been done to keep the facilities at a satisfactory level over the last few years.
unknown
No Lights enabling greater use
That it has no lights.
Unable to use at night when its not as hot during the wet season.
The darkness at night the ovals could be much better utilized
Limited training times due to no lighting. Currently can not accommodate night training and or regular home and away fixtures throughout the AFLNT season. Under used resource
That it doesn't get used to its full potential
There's no opportunity for night games, and it's probably not used quite enough
Some water area behind the main oval goals. Need better change rooms
No lights!!
No lights to have night games in the hotter months
No lights, no seating, shade or shelters on Gardens 2. Facilities are maintained well but getting a bit old.
no lights
no lights
Playground would be good for kids.
The lighting is insufficient and night games cannot be played there.
not enough seating around the ground.
Parking in the wet season
No lights at night -have to train earlier as a result
No lights No second grand stand for the back oval
No lights for night games or training
Lack of lights, amenities, change rooms
Once the sun goes down, training stops. No night games.
Waratahs
The back oval could do with more seating for spectators and protection from the rain.

Change rooms could be better, no lights.
No lights for night games
No lights for night games
No night footy
no lights
Change rooms have room for improvement.
Needs upgrading - lights groundstands,
Very small in capacity and shocking change rooms to cater for two ovals-
I like it
Nothing
Old facilities, no lights for night footy
Oval 2 is shocking after a bit of rain. mud patches everywhere.
It's not available for to use for night matches.
Nothing.
Being a player/ coach the change room set up is not the best for multiple ovals. They are very outdated as well. Another set would be great
Limited access
Nil
Facilities, lack of clubroom for Banks Bulldogs Football Club, lack of lights.
Lack of lights
No lights
No lights, change rooms need a renovation
the change rooms
No Lights, its only able to be used during the day and during the wet season to be able to play late arvo and at night would make a huge difference.
No lights
The old small change-rooms
Matches have to be played earlier in the day
Nothing
everything
Waratahs
No night games, night training
No lights. Waratahs
No lights and not enough change rooms

Hot location - better use in the evening
Turf could be a lot higher quality, don't feel enough games are played there to push curators to keep it at a high standard. Maybe the introduction of lights and more spectators would inspire this.
Oval two is not very good - upgrade the wooden seat grand stand
The Waratahs Club.
No decent lights
No lights. Having lights would bring NTFL action into the city and more spectators would come to watch night games. Who wants to sit on those lovely hills at 3pm???
No lights
Lack of shade, no lights.
Doesnt have lights
The changeroom facilities are due for an upgrade.
No lights not enough seating and shade on the back oval
No lights for night games
The ground
Bit Small
No night games
People illegally parking on gardens rd
change rooms are not very good. Would be great to be able to play night games there (and this would be safer for players and umpires, not having to play footy during the hot part of the day), but no lights.
No lights
Not utlised at night. Facilities such as the club house are old and rundown. Also should have more than one club house on site
The condition of the change rooms and facilities - also require work.
Gardens 2 and having to play on that instead of Gardens 1.
the grass can be taken care of a lot better
Underutilised.
The high entrance cost for spectators
Gardens 2 is shit and doesn't get maintained as well
Nothing
Lights
Underused
One club
Club rooms need renovating, change rooms need renovating
Lack of night football or 20/20 cricket Comp

No lighting, grandstands need repair
Nothing
Parking and no lights !
The walk to oval two when it has rained, too muddy
The change rooms
Not enough games played there.
Muddy surface in the center on oval 1 during the wet season making it hard to play in.
Love it as it is
No lights
That it is not yet lit up!
Only one access, not lighted.
No lights
The poor drainage between oval 1 and 2. The drinking that occurs in the Waratah club that results in drunk people.
The concept of having lights at such a beautiful facilty. Poor drainage during the wet.
Everything shit Field
Nothing
Nothing. It's a great place for sport any any improvements should attempt to retain its beautiful ascetic, heritage, trees, setting and atmosphere, while increasing usage for more people to enjoy.
Cant play at night
The toilet and shower facilities
No ability to play night games.Too hot during the day during wet season. Toilets are yuck!
Inability to play evening NTFL/Cricket matches; would also be fantastic for junior sport throughout the week in the evenings; more appealing cooler weather would attract more spectators as well.
Nothing
No lights Every thing else is awesome
No lights
No lights
no lights,
Can only be used during day time hours due to lack of lighting
That it doesn't have lights
there is no lights for night football
Football matches are usually only sunday

It needs and upgrade. Including lights.
No lights
Facilities
There is no lights on the oval making night games and late training impossible
No lights for night sports
No lights
No lights
Lack of lighting to allow for late games and training
No lights...
Unable to play night games there causing major games to be played in glaring heat
Not lighting, step up your game DCC
Limited use
Limited use after dark
That it has no lights and the center of the ground of oval 1 is rock hard
Bathroom facilities are poor
No Friday or Saturday night games
Cricket nets need upgrade. Oval #2 poorly drained
Daytime use only
Nothing just needs to be utilised more
That theres no lights
Training nets are substandard.
Needs more lights so more events can happen in the evening and night
I currently don't like that there is no installation of lights a night game in the cbd would be awesome
Cricket net facilities
No lights!
No lights
There's no lighting for night time
No lights
No lights, condition of second oval
Toilets
Could do with more change rooms now that womens AFL is taking off and I believe womens cricket growth in the NT isn't far away.
Needs lights, and should be held in higher regard for its potential to be a Territory sporting icon.
IT hasn't got lights

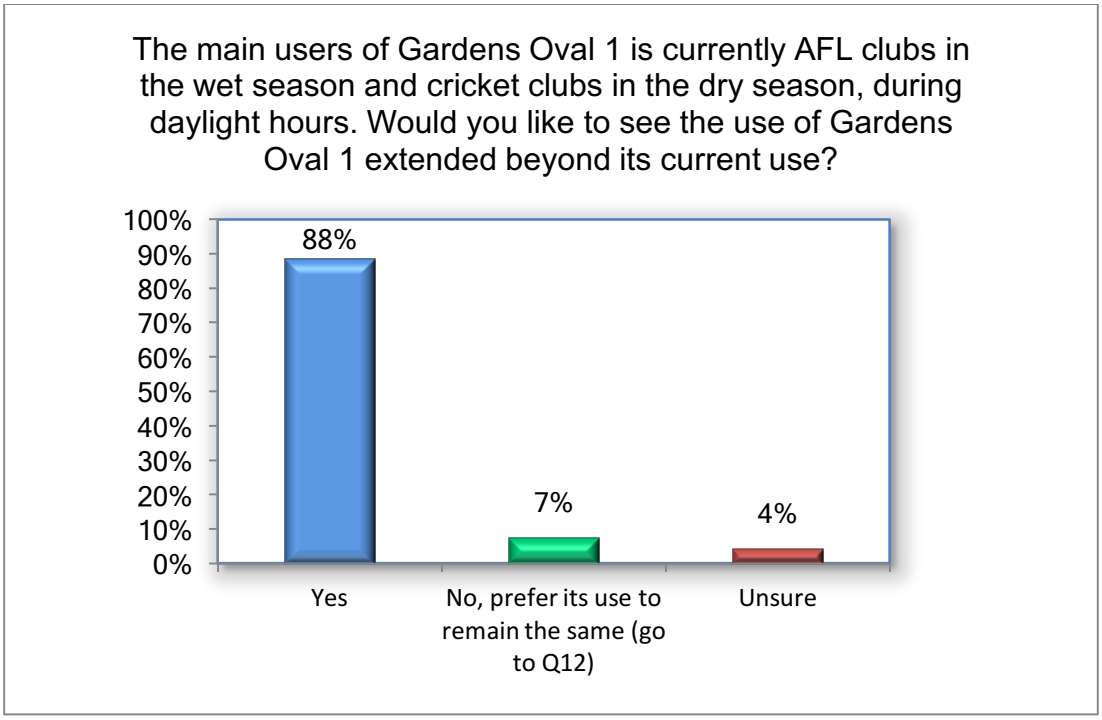
Lack of extra change room facilities
It cant be used at night
There is no lighting for night games, facilities are a little behind the times with regards to there being two ovals and one set of change rooms that do not cater for days when young girls and men are playing on opposing ovals and sharing the facility
There's no lighting to host night games, people can park on the side of the road which runs betweeen the oval and the Botanical Gardens and watch. Parking is limited to Mindle Beach area.
No lights
lackof spectator facilities
There is nothing I do not like about it.
No Lights, update of club rooms required.
There not much I can really fault
Carpark space
Not Much. Without lights limits it's capability in being one of the premier sporting grounds in the NT
that its not really open for everyone to use whenever
Parking across the road.
There are no lights.
Oval 2 needs work
Some outdated facilities.
The fact sport can only be played in the heat of the day
That there is no lights.
The toilets and change rooms - old and smelly
No lights, limits activities
Change room facilities, lighting
No ability to train or play at night time. The change rooms are dated & need upgrading
It's not used to its full potential. Lighting would help this.
Needs lights
From what I've heard from players, the cricket pitch in center of field one during dry season leaves rough ground during the ntfl season and has/can cause injury.
Can't have night games
Nothing
Nothing comes to mind
Lack of First Aid facilities under grandstand, used to be there years ago, plus the change rooms need an upgrade to include some sort of better cooling system, not necessarily air conditioning

Its good as is.
No lighting - suburban footy at night would be a great addition - especially in the warmer months.
Lack of lights, lack of female friendly facilities
Nothing This oval should be kept for what it has always been a venue for footy and cricket clubs only - the parking and surrounds are built and designed for this purpose only - to open it to other outdoor events festivals etc would negatively effect the quality of the grounds and pitch for sporting events - already there enough outdoor public space for festivals etc Keep some tradition in Darwin with this being a sporting only venue.
There is no on filed lighting.
The change rooms and cricket nets.
That it doesn't have lights
Lacking some infrastructure - lights, change rooms (currently not enough), poor security
Lack of storage for clubs and lack of lighting for night games.
Lack of night games and parking
No lights
No lights
No lights
That there's no lights.... Seriously?
Needs pool
No lights :)
Limited usage
The facilities for the most part are getting tired and there are a lack of change room facilities particularly with the introduction of womens teams
Training and games have a cut off at sun down really limiting potential opportunities to further involve the community in sport after working hours.
None
Lack of lighting, heat during the day is a grave safety risk to all players - especially children. More seating on Oval 2 would be great.
The grass needs to be cut more often
Cant play after dark
No lights
No lighting as it restricts our time at training and does not allow for night games.
No lights
That there are no lights therefore we are un able to play games at night, which would be better then playing in the heat of the day.

No lighting so no football games can be played under lights within the CBD. No other functions can be held at night at the ground at the moment.
It is all good
The lack of lighting for training and games
It can't be used for sport/functions after 7pm due to no lights.
Lack of lights that restrict training at later, cooler times or being able to play games under lights, which would allow a whole Waratahs or Banks family to play all their games from juniors to seniors in one day at one ground.
That it doesn't have lights.
No lights
That there is no lights so Friday night or Saturday night games can't be played and training ends as the suns going down .
No lights
No lights
No lights. No night games.
Watching midday games of footy during the wet season/build up!
No lights to train or not play in the heat of the night games
No lights, not enough grand stand seating, existing seats are old and damaged
The current facilities require updating
Doesn't have lighting.
No lights for Friday night games. Back oval needs work also.
Poor pedestrian connectivity to Gardens Road
Nothing really. Cleaner and better painted grandstands, grandstands seating old, outdated and uncomfortable.
Limited training and playing options due to no lights.
Only 2 changerooms and 1 clubhouse. Another 2 changerooms and another clubhouse would be great.
No lights
Has no lights
Lack of availability to use the ground after dark.
The fact that it can not be used at night
Old change rooms, lack of rooms for number 2 oval. No oval lighting. Poor stands on number 2 oval.
Not enough shade (especially on oval 2); and not enough change rooms. Parking across the road is OK but would like to see a reduced speed limit to make it safer for kids crossing
not enough variety of events
underutilised facility, need more clubrooms and changerooms
Needs more change rooms and better spectator/player facilities on the second oval.
Old, small, outdated changerooms for players

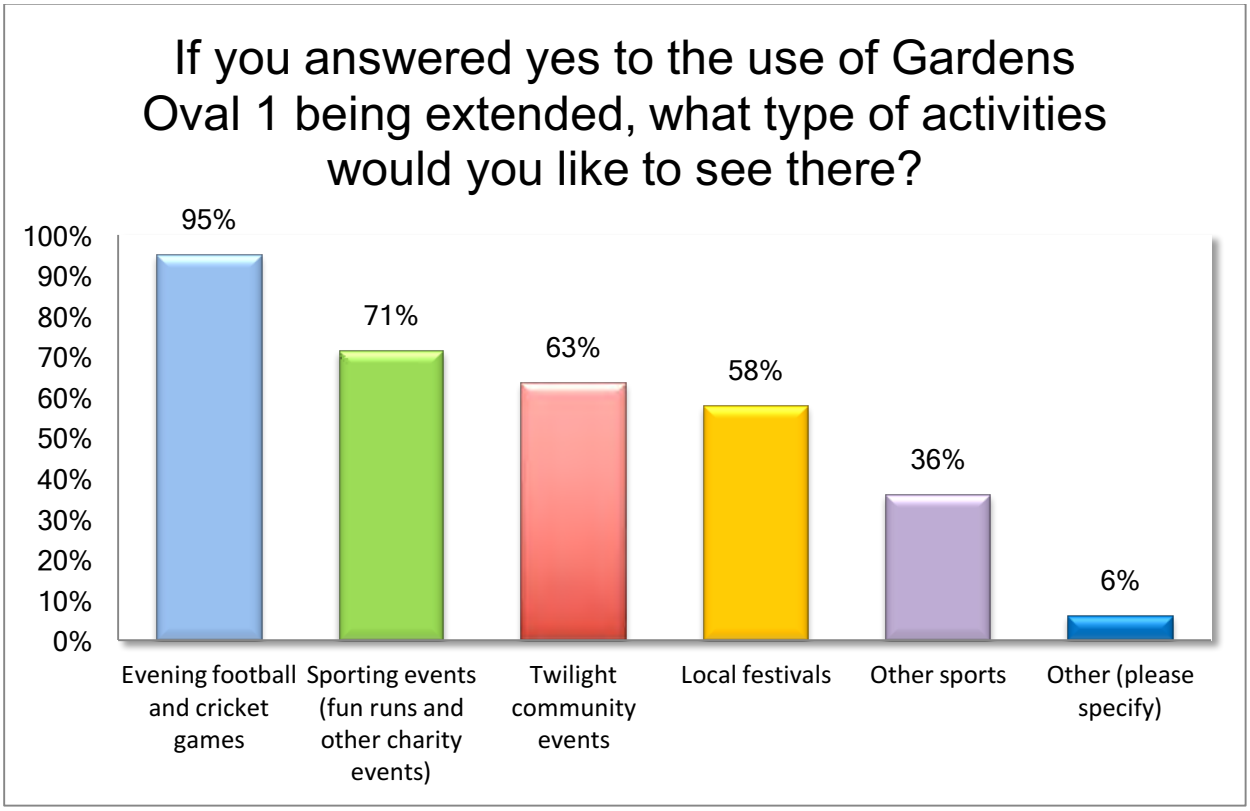
Better player benches away from drunk spectators Back oval needs to be upgraded and better seating for spectators

Q10 The main users of Gardens Oval 1 is currently AFL clubs in the wet season and cricket clubs in the dry season, during daylight hours. Would you like to see the use of Gardens Oval 1 extended beyond its current use?		
Response	**Response count**	**Response per cent**
Yes	346	88.49%
No, prefer its use to remain the same (go to Q12)	29	7.42%
Unsure	16	4.09%
answered question	**391**	
skipped question	**1**	



Q11 If you answered yes to the use of Gardens Oval 1 being extended, what type of activities would you like to see there?		
Response	**Response count**	**Response per cent**
Evening football and cricket games	337	94.93%
Sporting events (fun runs and other charity events)	253	71.27%
Twilight community events	225	63.38%
Local festivals	205	57.75%

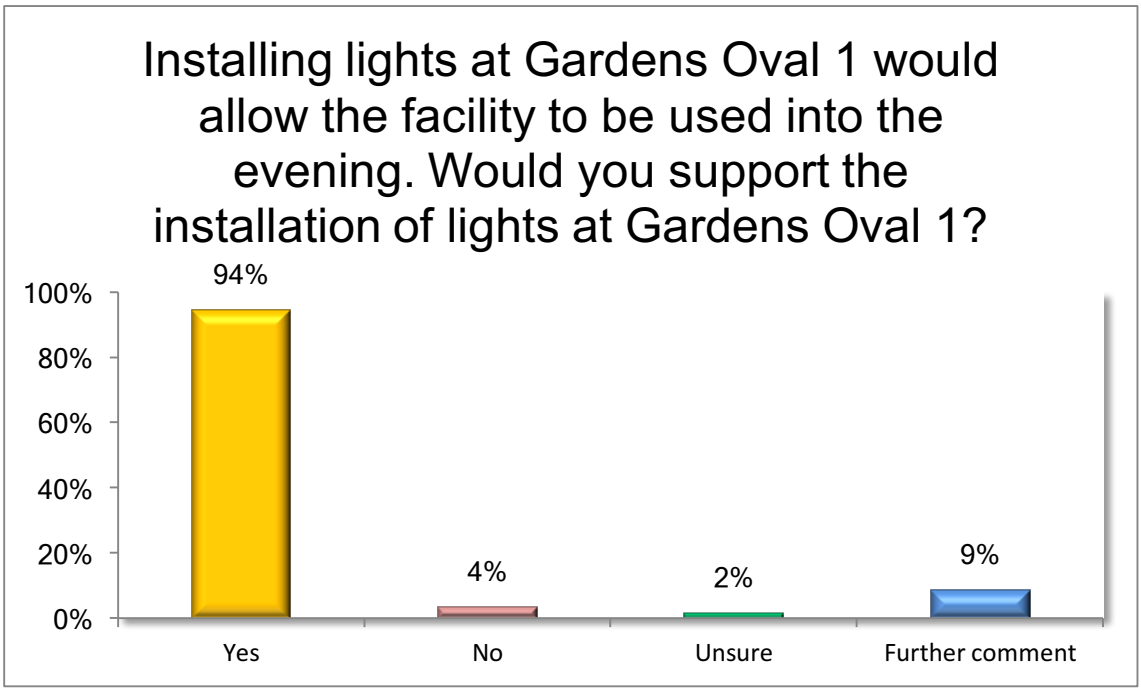
Other sports	127	35.77%
Other (please specify)	21	5.92%
answered question	**37**	
skipped question	**1**	



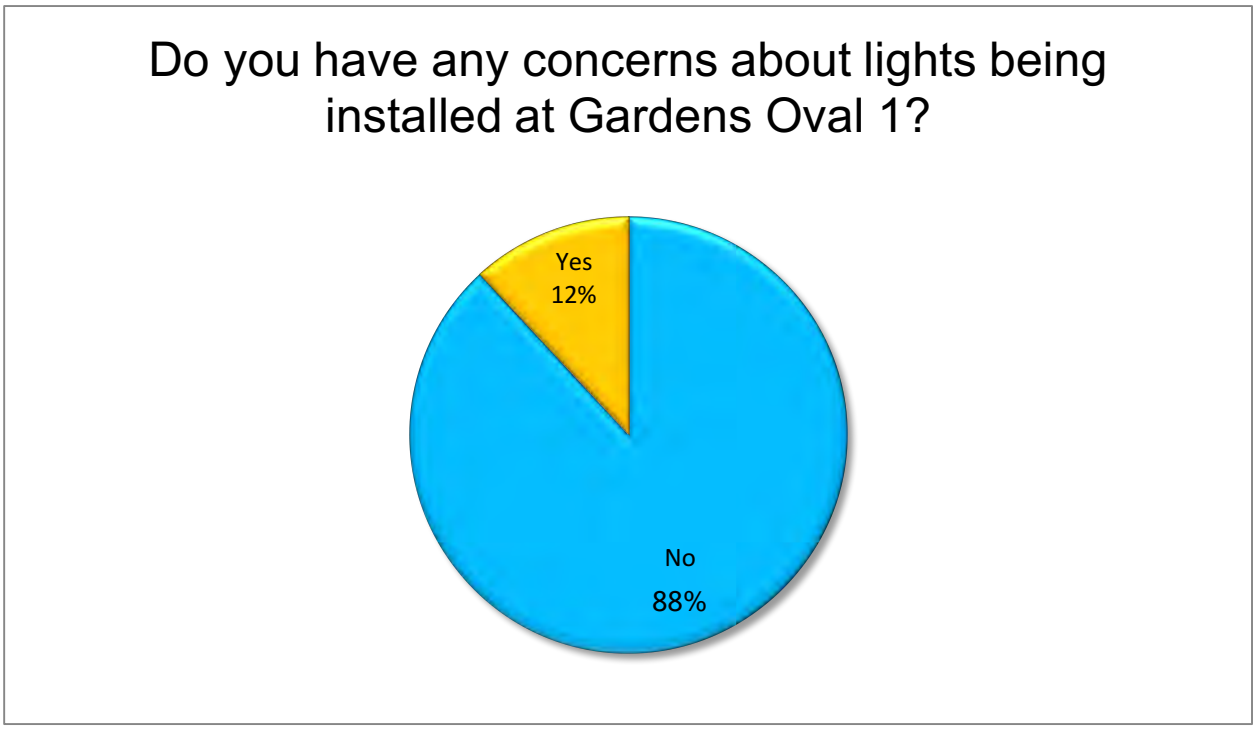
Q12 Installing lights at Gardens Oval 1 would allow the facility to be used into the evening. Would you support the installation of lights at Gardens Oval 1?		
Response	**Response count**	**Response per cent**
Yes	370	94.39%
No	14	3.57%
Unsure	6	1.53%
Further comment	34	8.67%
answered question	**392**	
skipped question	**0**	
Further comments		
If the light towers were retractable and only used until 8pm on weeknights I would be prepared to reconsider my current opposition to the proposed lighting.		

Too bright at night for all apartments in the area, compromise the tranquility of quite evening, devalue further apartment propert prices, people using or committees proposing to install the lights will not have their lifestyles compromised with glare. Just look at the Toyota / Kerry Holden caryards with their extremely bright lights installed without community consultation. No lights!!
Let's get realistic. It's hot during the day. Night sport is much better and more appropriate in Darwin
This brings Darwin in line with most other jurisdictions across the country.
I also own a property on gardens rd and I don't mind the installation
surely people who live in the area realised that they moved next to a sporting oval? Lights are a necessity for these kids
It would be a great idea to get everyone out of the hot darwin sun during the day
It would be so fantastic for the cricket and football clubs if Council decides to put lights in.
with limited residential directly adjacent the oval and with the proximity to mindil it would allow greater use of the space and resuce the need to play sport in the middle of the day which is extreme to say the least.
Investment in NT at a crucial time.
Would ease the amount of teams sharing an oval during footy season.
Absolutely, I think the community would benefit greatly from it.
Is Gardens still relevant? And what potential does it have? traffic and car parking and space are issue with the oval hemmed in tightly between two roads in a triangle formation
Bout time
Games of footy on a Sunday at midday are incredibly depressing. Saturday night would be much funner!
Yes, Darwin needs more ovals capable of hosting evening footy games, to be able to shift games from the dangerous hot part of the day
As long as the funding is not taken from junior development
This should be done asap - fewer daylight hours in the dry season restricts the usage times for oval 1
And also improvements (including lighting and any other upgrades) to Gardens Oval 2
I've been saying it needs lights for years.
Absolutely. I would attend far more often to see evening matches.
With a solar & battery facility to cover the running costs
How would the cost be recouped. Is it a user pays proposal and/or an additional cost on the clubs that use the facilities which may not be able to support the additional expenses
Please please, it would be outstanding and well overdue
it would help if a light of the same size and height was tested from the different locations that they will be placed and how the shrouds would help if at all.
evenings are the best time to play sport and have comunity activities because of our climate
I would like to see the adjacent golf course lit as well for night golf...a few self interested whingers stopped the process last time- please do not let that happen again.
If light did not spread beyond the oval and if it was not left on when oval not being used

Yes I support the idea.As a resident I hope you won't put unsightly towers in a pretty part of town.My main concern is the height of the light towers.
Only would support the installation of lights if strict time frames were adhered to that did not impact and result in residents having to endure prolonged exposure at night to unnecessary bright lights. ALL new lights installed should have SHROUDS to direct the lighting to the specific area that needs to be list without radiating unnecessarily to the entire vicinity
It's not desirable but an essential upgrade.
My partner is an NTFL player for waratahs and their midday games are ridiculous seeing them play in the heat is dangerous. Lights would provide the opportunity for late afternoon/games which would also be great for the younger & female players. Not to mention it would bring in a lot more spectators!
Friday night footy! Thursday twighlight 20-20 matches and then stroll to mindil markets for dinner



Q13 Do you have any concerns about lights being installed at Gardens Oval 1?		
Response	**Response count**	**Response per cent**
No (go to Q15)	342	88.14%
Yes	46	11.86%
answered question	**388**	
skipped question	**4**	



Q9 What are your concerns about lights being installed at Gardens Oval 1? **61 *answered question*** **331 *skipped question***
Responses
Disrupting the current users
Light pollution for locals Increased vandalism for the oval and surrounds Increased noise at night for locals
I worry that people's lifestyle will be effected and I am not convinced by the Artist drawings (Image 8 –) is correct, Artist images often do not give a true reflection of how it will work or look, I want to see more true evidence of how these lights will look when on.
Impact on local residents, especially those living in Buffalo Court, Salonika Street, Warrego Court, Smith Street, Myilly Point, Houston Street, Harriet Place, Dashwood Place. The lights will spoil their views in the daytime, create light pollution at nighttime and attract insects.
impact on nocturnal birdlife
We live nearby and the lights could be intrusive on our lifestyle.
High potential for light and noise pollution interfering with the amenity and enjoyment of my home.
affecting the amenity of owners homes in the area, who will be affected by the light as they ever look the oval.
Nil concern

Cost - would it place a financial burden on the club that would lead to higher player fees? If the increase is small or non-existent then I would support it.
As my other comments above. Also, the golf course on several occasion forgot to turn off their brights lights at night which meant light glare flooding into the bedroom until the next day.
HOPEFULLY THE COME FROM LOCAL SUPPLYERS
Make light towers with latest tech, limit the inherent ugliness associated with cheap fixes when installing light towers.
I live at (address removed for privacy) Larrakeyah, the view from my balcony is over golf course/gardens oval & bright lights would be right in the in the middle of that view.
The cost, is there a way Council can assist with the cost of the power usage and/or look at solar panels to assist with lowering ongoing costs.
none
Nil
Be mindful of the beauty and history of gardens oval. Keep the large shade trees, don't remove any large iconic trees for the light poles but work around them.
The longevity of the technology and how Council may recoup running costs for the lights.
Would they be installed before this coming NTFL season? If they were to do it before then they would have to really hasten the process.
I have no concerns
They might be too bright.
Concerns are if corners are cut and the lights installed are not appropriate for use. If this means waiting another 1-2 years or more for funding then it would be worth the wait for a better product.
No concerns
Money could be spent on junior development
The money could be used to put training lights up for all 5 Alice springs ts clubs
No real concerns apart from needing to fit in with the Reasonable concerns from locals living close by. Should have same requirements as Marrara TIO stadium.
Waste of money, may only be used a couple times a month.
That Darwin might actually progress out of the 1970's!!! Why does this even need public consultation. How on earth did they allow lights to be installed on the casino tennis courts!!! And what is going on with the velodrome!!! When can we expect a new one?
Money should be spent on maintaining the oval. The poor drainage is a real health hazard. As a rural resident if they have lights we will have to travel even further for our sport. Very frustrating and it moves the Berrimah Line even close to DARWIN.
The costs, the asethics, over use of the facility, increase the amount of time that the club house at the oval would be open.
Waste of money fix field it's shit
You can do your utmost to put in your so called unobtrusive lightings however it has been demonstrated to me that lights on off angle glare brightness are still under the control of someone and to date those in charge of

the current lighting of the car park in the complex have demonstrated they have no desire to turn down the lights in the car park. I asked them some time back to simply turn them down so they covered the car park (which was the reason they gave me for being there) instead of shining all the way up the hill into my lounge room. Locals had to undergo a long and arduous campain to stop the lighting of the golf course. That succeeded but such action takes its toll on all concerned. And now we are under threat of having to so campaign again. The same arguments these 2 groups use for lighting the oval can be used to light the adjacent "practice" oval and then the golf course will have another go. So tired of having to constantly be viligant about amenity of our living environs.... so tired I am plain Angry that once again the community must take on the "big players" just to protect their amenity. The questions you ask above about gender age address demonstrate to me that you will use the responses to "shuffle" the numbers of or "weight" the responses of submitters. So immediately on opening up your survey you destroyed my trust in your results.
I would only like to see the lights activated/used when events are on. This way the costs of running the lights can be factored into the ticket/event cost.
However - I would not like to see trees or shade disturbed by installation. Need to retain big beautiful trees around the oval.
That it takes way from the ambience of the region. The Gardens is a beautiful spot during the day and is very quintessential Darwin as it currently stands. There needs to be pockets of Darwin that remain as reminders of heritage to the city.
That the residents will complain
Concern about the clubs which use the facilities being subject significant increase in lease costs to amortise the capital costs as well as their ability to afford to pay the power costs. Given that most clubs are already cash strapped
the lights that will affect the use of my balcony and living room at night. At the moment there is a problem with the lights on the tennis courts and they are not as big as the proposed lights for the oval.
With installation of lights there are always concerns. The one biggest concern I have mainly is because of the coverage the lights will have. As a boundary umpire for the NTFL it is vital that the boundary line even over the fence line where the spectators sit is vital for our vision in making decisions.
should have been done ages ago and the same applies to the Golf course where evenings are best time to play. Lights shining down do not interfere with higher residences All residences are well away from gardens oval and are high enough to not be unduly affected. recent use of hole one at the golf course has shown minimal effect on the locality It is arguable that the light during eenings would enhance the appearnce of the locality I should be able to get a copy of these comments for future reference
Extra noise and congestion from cars / traffic and crowds / sirens, street parking issues, plus light pollution. Also over time the amount of usage and times will expand to what is stated currently as more organisations wish to use the facilities, even extending to outside of sporting organisations. I don't trust councils to keep their

word on what they state will occur. In the future there will be more and more changes to usage. Then our property values may be damaged.
It effects the wildlife in he area and the lights wil shine in my house. And more crimeans noice
Modern, efficient, lighting system needed such as LED's
Excessive noise at night & the height of the towers causing an unsightly look in a pretty part of town.
impact on local wildlife. impact on who will pay for them - both initially and ongoing lighting costs. are AFL and cricket going to pay for them being turned on just for them, seems a small section of the population will benefit. pllease ensure the most environmentally appropriate lighting is chosen
Fix up parking so people not crossing road randomly at night. Dangerous
None it should have happened years ago
Keeping the ground in peak condition particularly in the wet season
Where they will be put
Overall control needs to be the Council's responsibility, not any individual group..
None
ALL lights must have SHROUDS to direct the lighting to the specific area that requires the lighting rather than glaring to the entire vicinity and surrounds negatively impacting upon residents. Also strict time lines should be given that the lights are only on at the necessary times in use - the tennis courts near Mindil are UNNNECESSARILY left on until late into the night with the glaring bright lights negatively impacting upon our home
Cost to run the lights
Suggested light levels and times do not allow for midweek afl or cricket games.
As long as they are as environmentally friendly as the NT Gov can make them there should be no problem, they will not be on all hours of the night. They are not a problem in the northern subburbs and they were built years ago and I'm sure before plenty of advancements in technology
Overuse of oval that deteriorates playing surface is only potential concern.
My concern is the burden of cost when using the lights.
Cost to the community or users - who is paying for the lights? security and safety to the area at night time. Also increased traffic across the road to the car park with kids at night - needs a speed reduction
Trenching for power cables, light footings, damage to trees, turf, irrigation infrastructure, durations of works
none

Q15 Would you like to be kept informed about this consultation and the lights proposal?		
Response	**Response count**	**Response per cent**
Yes	178	46.11%
No	208	53.89%
answered question	**386**	
skipped question	**6**	

APPENDIX 3 – WRITTEN SUBMISSIONS

Submission No*.	Date	Category	Details
1	14 June 2017	Stakeholder	Lighting Specialists Australia: Providing information on lighting services company can provide.
2	19 June 2017	Stakeholder	Halytech: Providing information on lighting services company can provide.
3	3 July 2017	Resident	Submission via email comments
4	19 July 2017	Resident	Submission via email comments
5	20 July 2017	Resident	Submission via email comments
6	27 July 2017	Resident	Submission via email comments
7	27 July 2017	Resident	Submission via email comments
8	28 July 2017	Resident	Submission via email comments
9	31 July 2017	Resident	Submission via email comments
10	1 August 2017	Resident	Submission via email comments
11	2 August 2017	Resident	Submission via email comments and photos
12	5 August 2017	Resident	Submission via email comments
13	7 August 2017	Resident	Submission via email comments
14	9 August 2017	Resident	Submission providing two photos of tennis court lights
15	9 August 2017	Resident	Submission via email comments and photo
16	10 August 2017	Resident	Submission via email comments
17	10 August 2017	Resident	Submission via email comments and attached questions and copy of advert
18	11 August 2017	Resident	Submission via email comments
19	11 August 2017	Resident	Submission via email comments and attached photo
20	13 August 2017	Resident	Submission via email comments
21	13 August 2017	Stakeholder	Submission via email comment, letter from Darwin Football Club, Football Federation NT Hot Weather Policy and data
22	13 August 2017	Stakeholder	Planning Action Network Inc (PLAN) covering email and attached written submission
23	16 August	Resident	Covering email with attached photos, light pollution information

**There were 18 submissions received, with some of the above submissions forming one submission (email, letter and photos sent from same person or organisation was considered one submission).*

Submission 1

Lighting Specialists Australia

Professional Design Solutions and Consultation

ABN 96 119 500 997

1.0 Lighting Capability

Lighting Specialists Australia (LSAU) has a team of experienced professionals with diverse backgrounds (including architecture, interior, mining, sports, road and building lighting). We are dedicated to developing total concepts in visual perception and converting them into real experiences.

Our in-house design skills include Sports Broadcast lighting specialists, lighting design for international Sport stadiums, sporting precinct, roads, paths, office, facade, Heritage, architecture, workshops, , stockyards, conveyors, transfer stations, crushers, open pit, jetty and wharf lighting for mining areas.

We provide concepts, modify architectural rendered impressions to simulate completed projects, and simulate environments through computer modelling. Computer modelling includes calculation of lighting level as well as computer generated 3-D colour rendered images. Our computer simulations can be for electric light, sunlight, daylight and the combination of solar and electric light.

Design of sustainable and practical lighting for mining areas, processing plants and onshore facilities requires good understanding of the Australian standards, mining lighting requirements and the mining environmental conditions.

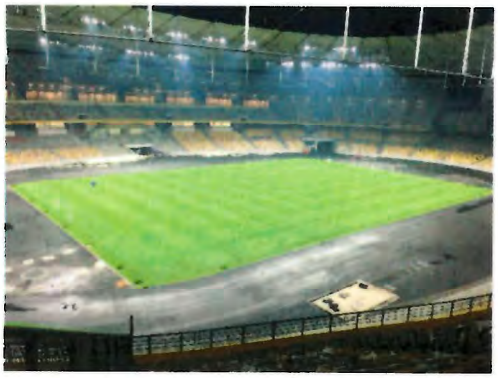
Careful consideration needs to be taken to address Occupational Health and Safety issues on site. Lighting Specialists Australia provides sensible lighting design in line with the Client's target to minimize potential harm in the workplace, and the same time give proper consideration to the environmental aspects of the lighting.

As Lighting Designers and lighting specialists we are in touch with world leading manufacturers of lighting, lighting systems and lighting related materials and finishes as a standard ongoing process of being at the leading edge of knowledge. We contribute back to the industry by serving in voluntary positions for the IESANZ (The Illuminating Engineering Society of Australia and New Zealand).

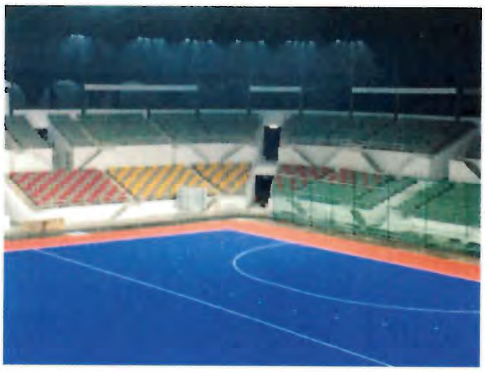
PO BOX 1129 ·Joondalup DC ·6919· WA ● M: 044 9141 426 ● mervin@lsau.com.au

14 June 2017

1.1 Our Services



1) Sports Broadcast lighting specialists
2) Lighting Standards and Specifications
3) Master planning and strategy
4) Project management
5) Contract administration
6) Internal lighting design
   - Indoor Sports lighting
   - Architectural lighting
   - Control room Lighting
   - High Security Prison Lighting
   - Green star Office Lighting
   - Lighting assessments



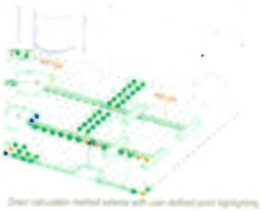
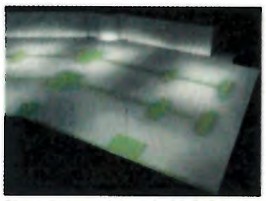
7) Industrial lighting designs
   - Roads / street/Pathway lighting
   - Mining and heavy industries lighting
   - Apron lighting

8) Exterior lighting design
   - Landscape lighting
   - Sports & Stadium lighting
   - Public and urban lighting
   - Architectural lighting
   - Heritage
   - High security Prison Lighting

9) Lighting assessments and reports
   - Sports Lighting assessments
   - Environmental impact assessments
   - Lighting impact assessments for councils
   - Lighting audits for mining and resources industry
   - Day lighting assessments

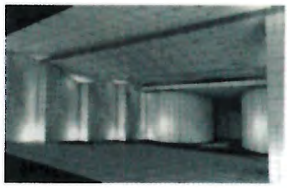
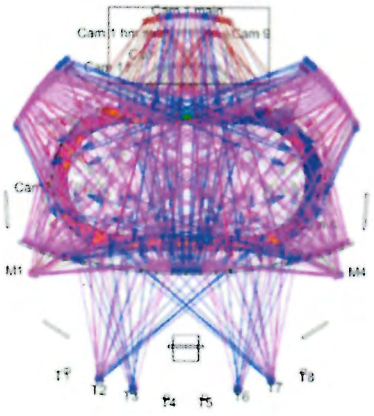
1.0 Lighting Software

1) AGI 32
2) Dialux
3) Dialux Evo
4) Calculux
5) Relux





2.0 Key People

Name	Mervin van der Linde
Position	Lead Lighting Consultant
Qualifications	MIES (Qualified Lighting Professional)
	RLP (Registered Lighting Practitioner no: IES2353)
	IESA – Illumination Engineering of South Africa (IESSA no: VAN0015)
	Green Star Accredited Professional
	N.H.D Mechanical Engineer
Affiliations	IDA - International Dark Sky Association

Lighting Specialists Australia

Professional Design Solutions and Consultation

ABN 96 119 500 997

Key Capabilities

Mervin is a Specialist lighting consultant and designer with a passion for lighting.

Mervin has over 20 years' experience in Lighting consulting and project management.

Mervin's formal training is enhanced by experience from design and engineering aspects as well as manufacturing and supply. His experience in consultancy and contracting, design, documentation, contract administration and project management skills makes Mervin a valuable asset to any lighting project.

Projects

Mervin has worked on several projects around the globe, including:

1. **Sport field lighting design projects**

1.1 New Perth Stadium:

Lighting Specialists Australia (LSAU) were awarded a contract to provide advice and technical support in relation to the engineering services for the stadium and the associated precinct.

Key State from the start of the project, at the briefing stage, through to the tender evaluation and award date. LSAU is now involved in the construction and handover stages. Our contribution resulted in a very clear vision on how the project will perform in the event of an emergency. Our Directors were also able to propose and implement a tailor-made sustainability scheme for the stadium and precinct.

Scheduled for completion in 2018, the new Perth Stadium and Sports Precinct is set to have the third biggest capacity in Australia with space for 60,000 seats, making it the second largest AFL home stadium. The new stadium will be the centrepiece of an emerging east side precinct at the gateway to Perth and is within walking distance of a range of potential transport options including footbridges, ferries, and trains.

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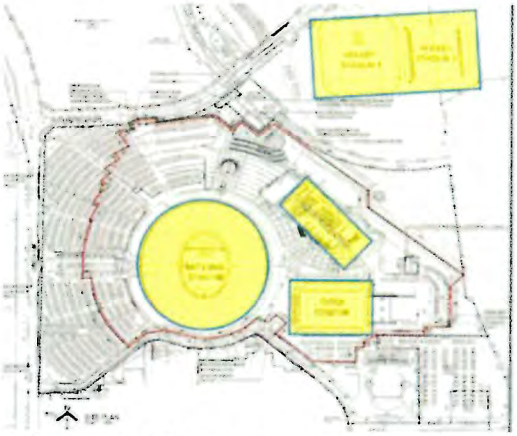
1.2 KL Sports City at Bukit Jalil Malaysia:



Lighting Specialists Australia (LSAU) appointed as main Lighting consultant associated with Sports venues rejuvenated as world class sporting complex ready for the South East Asia (SEA) Games in 2017.

Lead lighting consultant for the lighting master plan for the KL Sporting city in Malaysia, implementing a high-level lighting mater plan for the whole city including urban lighting, road lighting, architectural lighting and sports lighting. Our work included Strategic review of existing sports lighting for the refurbishment of five derelict stadia site surveys and assistance to the lighting designer to implement sports lighting for international broadcasting.

- Bukit Jalil National Stadium

The largest stadium in South East Asia, Bukit Jalil can seat 87,000 people and has previously held major events including the 1998 Commonwealth Games, the 2007 Asian Cup (soccer) and exhibition matches with Manchester City, Liverpool, Arsenal and Chelsea.

- Axiata Arena (national Indoor stadium)

Recently renamed Axiata Arena, the well-known Putra Indoor Stadium has 11,000 permanent and 2,232 retractable seats, making it a flexible space for indoor sports and events. Among many others, the venues has hosted boxing, badminton, basketball table tennis and judo with major events such as WWE, Disney Ice, the 2009 ASEAN Para Games and concerts from Taylor Swift, to Michael Bublé and Alicia Keys.

- National Aquatic Centre

Comprising Olympic standard swimming pool, warm-up areas and diving pool, the Aquatics Centre has a distinct shaded fabric roof, open to natural ventilation with views to the landscape beyond.

- National Hockey Stadium's

Home of the Malaysian national men's and women's field hockey teams, the stadium seats up to 12,000 people and has hosted matches in the 2002 Men's Hockey World Cup, 1999 Hockey Asia Cup, 2003 Hockey Asia Cup, 1982 Hockey Junior World Cup, 2000 Hockey Junior Asia Cup and 1998 Commonwealth Games.

International FIFA Stadium

- Cape Town - Green Point Stadium lighting design and specification FOR 2010 Soccer World Cup.
- Loftus Stadium South Africa: lighting design and specification FOR 2010 Soccer World Cup.
- Phokeng Stadium South Africa: lighting design and specification FOR 2010 Soccer World Cup.

- Orlando Stadium South Africa: lighting design and specification FOR 2010 Soccer World Cup.
- Ellispark Stadium South Africa: lighting design and specification FOR 2010 Soccer World Cup.
- Soccer City South Africa: lighting design and specification FOR 2010 Soccer World Cup.

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- Peter Mokaba Stadium South Africa: lighting design and specification FOR 2010 Soccer World Cup.

- Moses Mabhida Stadium-Durban South Africa: lighting design and specification FOR 2010 Soccer World Cup.

1.3 Local Sport venues in Western Australia

- Canning Leisure and Aquatic Centre, Perth Western Australia- lighting design and specification.
- HBF Sports grounds and Aquatic Centre, Perth Western Australia- lighting design and specification.
- Inglewood Oval City of Stirling, Western Australia- lighting design and specification.
- Celebration Park City of Stirling, Western Australia- lighting design and specification.
- Lake Gwelup Reserve City of Stirling, Western Australia- lighting design and specification.
- Woodlands Reserve City of Stirling lighting, Western Australia- design and specification.
- Birralee Reserve City of Stirling, Western Australia- lighting design and specification.
- Karrinyup Reserve City of Stirling, Western Australia- lighting design and specification.
- Rosalie Park sports ground City of Subiaco , Western Australia- lighting design and specification.
- Eadon Clarke sports ground City of Geraldton , Western Australia- lighting design and specification.

2 Lighting Assessments/Audits

- KL Sport city: National Soccer and Athletic stadium (FIFA &IAAF) Broadcast lighting assessment
- KL Sport city: National Aquatic center (FINA) Broadcast lighting assessment
- KL Sport city: National Hockey Stadium(FIH) Broadcast lighting assessment
- KL Sport city: National Indoor stadium (FIFA &IAAF) Broadcast lighting assessment
- Patterson Stadium Sports AFL Broadcast Lighting assessment
- Softball WA-feasibility Sports lighting assessment
- Town of Bassendean AFL Oval Sports lighting audit
- City of Karratha Wickham Sports lighting audit and realignment
- North Freamantle AFL oval sports lighting assessment

Subject: Introduction to Halytech Illuminator for Sports field Floodlight management system
Date: Monday, 19 June 2017 at 3:57:45 pm Australian Central Standard Time
From: Tony Polchleb
To: jo@truenorthcomm.com.au
Attachments: image001.png, A Brief Overview of Halytech.pdf, illuminator_brochure.pdf

Hello Jo,

I read with interest the proposal to Floodlight Gardens Oval 1 and believe that this information could be of interest to Council.

Firstly, Halytech is an all Australian company designing and manufacturing smart monitoring and controlling systems here in Sydney. I have attached an overview document giving a brief outline of the company.

In particular I would like to introduce you to a product called Halytech **Illuminator**. The Halytech Illuminator is an Australian control and monitoring system designed specifically for sports fields, parks and other public places. Illuminators are currently deployed and used by Local Governments and private organisations across Australia.

Halytech Illuminator is a cost effective floodlight control and facility monitoring system for sports fields, parks and other public places. Using a web interface, facility managers set up clubs so that authorised members can turn lights on or off via SMS at prescribed times and days.

Each Illuminator can

- control up to 8 independent groups of lights
- support more than 50 authorised user groups
- automatically send usage and billing reports

Designed in conjunction with local councils and sports clubs, the system is suitable for a single field or a whole regional network of fields and facilities.

Authorised members (AFL/Cricket club) use their unique PIN to control lights through SMS messages or via a keypad at the facility. Changes in schedules due to weather, time extensions and other unforeseen events are handled by the clubs themselves, requiring no involvement of the facility administrator and potentially saving energy and costs.

There is improved safety for club users who are not required to open up power boxes or operate switches.

it avoids having lights on unnecessarily which wastes energy and generates greenhouse gases. It does this by putting the clubs in control and to decide whether they need the field/court lights on or not on the days/times allowed by the administrator.

The administrator can remotely close down the facility or remotely turn lights on or off as required

The required LUX settings for respective day/time/use can be automatically programmed so that when a club remotely turns on the lights at their scheduled times.

The system records every command, identifying the user that issued it, and automatically sends periodic reports via email (csv files). The reports can be used to prepare billing and usage reports.

I hope that this is of interest and I will make a follow up call on the number supplied.

Please don't hesitate in contacting me for more information.

Regards

Tony

Tony Polchleb
Sales and Marketing Consultant
T +61 2 8814 5235 **F** +61 2 8814 6108
M 0418 163 313 **E** tpolchleb@halytech.com.au
11/22 Lexington Drive Bella Vista NSW 2153
PO Box 6983 Baulkham Hills BC NSW 2153
www.halytech.com.au

A brief overview of Halytech

- Halytech is a an all Australian, privately owned company that started in 2000 to develop, manufacture and sell a new range of internet capable data loggers and controllers. The initial target market was the environmental monitoring market, primarily government authorities and councils.

- Halytech has grown and now sells a broad range of solutions that are used throughout Australasia, Asia Pacific and the US and more recently in India and South America. Our customer base is quite diversified and is split approximately 50/50 between government authorities and commercial organisations.

- Some examples of the more widely recognised Halytech customers include; Sydney Water, South East Water, QIC, CBRE, Baiada Steggles, Sanitarium, BHP, Department for Water SA, Elster, RMC, Blacktown Council, Watpac, Lend Lease, Knight Frank, Melbourne Water, Stockland, Lang O'Rourke, TAFE, Sun Water, Rheem, SA Water, SEQ Water, Ventia, ALS Global, Geomotion, Prospect Environmental, Sydney Uni, Macquarie Uni, James Cook Uni, Curtain Uni, Hamilton Island Management Group, Goulburn- Mulwaree Council, as well as many other local and Regional Councils throughout Australia.

- Halytech is fully self-funded and invests heavily in R&D to provide advanced but easy to use solutions.

- Halytech takes a fairly conservative approach to growth and its strategy is to invest in new ventures only where Halytech has unique advantages either in skills or technologies.

- We avoid the use of proprietary software and data formats, promoting open internet protocols and data formats that can be used on any computer or software platform.

- All Halytech systems have an integrated web server so no special software or computers are required to set up or manage our systems.

- Halytech systems do not rely on any Halytech servers, rather all the 'smarts' are built in so that the data goes directly to you or your systems. There are no ongoing license fees or server fees payable to Halytech.

- All Halytech equipment is designed by Halytech in Sydney and uses one of Australia's largest electronic manufacturing houses to produce its equipment.

- Halytech does all final assembly and testing in house to ensure quality. Using this approach Halytech can easily ramp up volumes to meet large projects within a short timeframe.

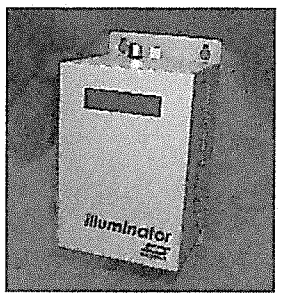
- The majority of Halytech customers deploy the systems themselves however over the last few years Halytech has been offering turnkey systems including web based portals for customers who do not have the necessary in-house staff.

- For these turnkey solutions Halytech will, where appropriate, partner with 3rd party organisations (often our own customers) to deliver the solution

- Halytech prides itself on providing highly reliable equipment that is easy to install and use, even in the most challenging environments.

illuminator™

Floodlight control and facility monitoring system



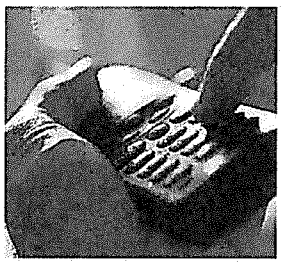
Complete system

Description

Halytech **Illuminator** is an Australian control and monitoring system designed specifically for sports fields, parks and other public places.

It can easily be added to existing installations to provide sophisticated control of floodlights and sprinklers and to monitor and report system failures, intruders etc.

Field users are issued with unique PINs that enable them to control the lights directly. Lights can be activated remotely by sending SMS text messages from mobile phones or locally through a numeric keypad. Changes in schedules due to weather, time extensions and other unforeseen events are handled by the users themselves, requiring no facility administrator involvement.

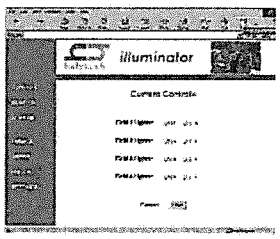


Send SMS to turn lights ON and OFF

Illuminator records every command, identifying the user that issued it. Recorded data is used to prepare billing information and usage reports accurate to one second. Reports can be automatically e-mailed once a day.

Each **Illuminator** has a built-in web server. Administrators can use any computer to remotely access an **Illuminator**. No special software is required. By using the familiar "web-browsing" approach, administrators can:

- Manually control all lights, sprinklers etc.
- Manage users and their PINs
- Retrieve stored data



Access with any PC from anywhere

In addition to controlling lights and other devices, Halytech **Illuminator** is able to monitor a variety of sensors including intrusion detectors, power meters, water level indicators etc. Abnormal sensor readings will trigger alarms, sending SMS messages to responsible parties.

Typical Applications

- Sport Fields
- Parks
- Tennis Courts
- Community Halls
- Clubhouses
- Public Toilets

halytech

Specifications

Benefits

Facility Administrators

- Full remote control of all functions
- Remote access with any PC
- No intervention required due to schedule changes
- Reduced wastage - lights don't come on until activated by the user
- Improved accountability - full log of all activity
- Reduced cost and response time - new users can be given access in a matter of minutes
- Improved efficiency - PINs can be notified by phone, no need to send physical items such as keys, access cards etc.
- Improved security - change PINs as often as desired
- Improved vandal and damage control - use alarms to notify break-ins, flooding etc.
- Simple installation and setup
- Designed and manufactured in Australia - readily available local support

Users

- Reduced cost - pay only for actual usage
- Increased convenience - no need to inform anyone of game cancellations or time extensions
- Increased convenience - turn on the lights while driving to the field, the lights are warmed up and ready on arrival
- Increased convenience - use your own mobile phone, no need to search for light switches etc. in the dark
- Increased convenience - No mobile phone? - Enter the same PIN using the keypad
- Increased convenience and security - no keys or access cards to lose or forget

General

Dimensions (approx)	110(W) x 200(H) x 85(D) mm
Weight (approx)	800g
Operating Temperature	0 - 50 C

Power Supply

Input Supply Voltage	Nominal 12V DC
Input Current	less than 120 mA

Sensor Inputs

Total number of inputs	8
Input types'	Digital, voltage free switch contact Digital, voltage sense Analogue, 4 - 20 mA Analogue, 0 - 10V

Device Controls

Number of controls	8
Number of timers	8 (1 per control)
Type	Normally open relay contacts
Contact Rating	1A 30VDC resistive
Activation	with browser, SMS reception, timer, alarm activation

Alarms

Number of alarms	8
Type	SMS transmission and/or control activation

Data Recorder

Capacity	10,000 records
Time Resolution	1 second
Download format	CSV - compatible with all spreadsheet programs

Communication Interfaces

Ethernet	10 base-T, RJ-45 connector
Cellular phone module	Built-in NextG or GSM (as required) External antenna
Keypad Input	RS-232C

Keypad

Type	12 keys
Power Supply	Supplied by Illuminator

All specifications are subject to change without notice.

Halytech
PO Box 6983
Baulkham Hills Business Centre
NSW 2153 Australia
Phone: (02) 8814-5235
email: sales@halytech.com.au
www.halytech.com.au

halytech

Submission 3

Monday, August 28, 2017 at 6:10:30 PM Australian Central Standard Time

Subject: RE: Lighting Gardens Oval Consultation
Date: Monday, 3 July 2017 at 10:33:51 am Australian Central Standard Time
From:
To: Jo Madin,
Attachments:

Hello
I think it would be fantastic and well overdue for the oval to be used at night time and would be a massive financial boost for the hosts of the Oval, Waratah cricket and football to be able to use the club to its full benefit at last, it's a white elephant as it is. I can't see it being any problem for us at Raffles and other parts of the Gardens community so long as it is kept to a reasonable hour.

Thanks

From: Jo Madin [mailto:jo@truenorthcomm.com.au]
Sent: Thursday, 29 June 2017 2:30 PM
To:
Subject: Lighting Gardens Oval Consultation

Hi Laurie

Thank you for taking the time to talk to me earlier about the proposal to light Gardens Oval 1.

As I mentioned, I would be happy to meet with you and any other residents to discuss the proposal. This would allow people to learn more about what's being proposed and I can hear more about people's concerns so I can communicate them back to Council. I could also ask the lighting consultant to attend and bring along one of the lights so you can see them and the shroud, and we can talk about the visual assessment that was undertaken to demonstrate impact on the surrounding area. This information will also be available at the community event being held at Gardens Oval on 26 July from 5:00 – 6.30pm.

As you know the following website has all the information and a link to the survey which I urge people to fill out https://www.darwin.nt.gov.au/gardensoval

Kind regards,

Jo Madin Senior Consultant
True North Strategic Communication
Ph: 08 8981 6445
Mob: 0448 656 668
Email: **MailScanner has detected a possible fraud attempt from "applewebdata:" claiming to be** jo@truenorthcomm.com.au
www.truenorthcomm.com.au

Submission 4

From:
Sent: Wednesday, 19 July 2017 12:49 PM
To:
Subject: Items For Proposed Meeting

Hi

Below are several items to raise on my behalf at the meeting this evening. I have spoken to and she stated to write the items down and forward to her, however, I don't have her email address anymore since my hard drive crashed.

Items:-

- Compromise of lifestyle. The introduction of the lights would cause significant amounts of glare that would become distracting whilst sitting on the balcony of an evening or inside. This would mean purchasing additional curtains at extreme cost to block out the bright lights. There are already a number of intense lights that cause annoying glare and impact our lifestyle ie. The lights at Kerry Holden. No permission or public consultation was seeked when these lights were placed in the caryard and as a result our living area and bedroom is lit up throughout the night. The residents of Raffles have already experienced what it is like to have bright lights in close vicinity with the golf course proposal. On several occasions the lights were left on all night as they were neglected to be turned off, thus causing great distress with lack of sleep. The groups wanting to introduce the lights will not be living in the area and will be oblivious to the stress it will cause.
  The gardens / golf course area is a quiet, stress free, comfortable neighbourhood where the residents have thoughtfully purchased expensive property to enjoy the tranquil environment. The lights will obviously disrupt the tranquillity and will not be tolerated.

- With the ever increasing numbers of lights already in place or proposing to be erected has an independent impact study will/ever be conducted on the effect it has on both lifestyle compromise and mental health in a high density living area with high rise apartments.
  Government/local council possibly should consider legislating the use of bright, intense lights that will impact any residential areas in the vicinity. High rise apartments are one of the first to be subject to these distractions which directly impact living standards.

- As discussed with since the proposal of the lights has been made public, I have taken extra notice of the glare hazard the Marrara lights has at a level similar to a 9 storey building whilst landing on RWY 29 into Darwin at night. Even from approximately 5kms away the lights are so bright to the point of being distracting to aircraft landing but if one looks at the lights for any period of time, night vision is affected leaving a white imprint on vision. The glare is overwhelming. Also, the Marrara lights are visible from our apartment.

- There are numerous sports grounds, Marrara being one of them, why not just use those grounds where it is away from any high rise dwellings. This is what Marrara was specifically designed for.

From: **Sent:** Thursday, 20 July 2017 11:43 AM
To:
Subject: RE: Gardens Oval Lights - Community Event

Thanks

I am a local resident of The Gardens and welcome the extra use of the oval to increase community participation in sport.

I have already responded to the survey, but will not be able to attend the function next Wednesday as I have a prior engagement listed.

regards

RE: Lights at Gardens Oval No.1

27th July 2017

I write to object to the lights at Gardens Oval No.1.

I am concerned, not just for the lighting, also as a rate payer. In the long term, that the rate payer will have to carry the responsibility.

My questions and concerns are:

1. Is there an environmental report?
2. Is there a pollution report?
3. Is there a noise report?
4. How many trees have to be removed?
5. Who pays for the maintenance and the electricity as it is very close to the sea and salt water will create damage to the steel structure?
6. The structure is for the long term – for many years to come what is the costing for maintenance – I'm sure there are other issues?
7. Where is the respect for the creatures that live in the gardens?
8. As a rate payer and resident of Larrakeyah I do strongly object to have lighting at the Gardens Oval No.1.

Subject: (none)
Date: Thursday, 27 July 2017 at 3:59:24 pm Australian Central Standard Time
From:
To: Letters to Editor NT News
CC:

Good Afternoon All,

Thank you for your letter of objection, which covers many points of conflict for residential impact by the extension of hours of use of Gardens Park Ovals due to the installation of four enormous 32metre high Light Towers. According to Mr Goggle 12metres is equivalent to 4 stories so these poles will be Higher than 10 story buildings. They will be a blot on the landscape from every direction, lit or unlit! The beams of light will disturb us rate paying humans as well as any bird, animal or wildlife in the vicinity.

I would like to point out that Marrara Sporting Complex was built with tax payers money to give ALL sporting bodies access to all the facilities that were needed, to train and play a proliferation of sports. Why now, is there a need to open Gardens Park six nights a week with towering lights, presumably at Tax and Rate Payers expense, when we already have like facilities ready waiting and in the vicinity of where the people who want to use them, live. How many of the sports people involved actually LIVE in this area?

I also object to the increased traffic that will be speeding up and down Smith Street and around the Lambell Terrace round about and down the hill past Sky City. This will obviously happen much later at night and on many more nights than we currently experience. Living in a street front apartment, I have used what I can to quieten the noise, but increased and later traffic flows will definitely have an impact on our comfort, quality of life and sleep.

I object too, to the rubbish that is strewn in gay abandon after every market day and public function of anytime around the oval and Mindil Beach area, that builds up on the verges and gardens of those of us who live in the "strew line". Sporting enthusiasts seem to enjoy food and drink as much as the rest of us, or even more so, and the cans, bottles and wrappings are distributed widely even when rubbish bins are provided, and even more so when they are not, which appears to be the norm as I do not recall a rubbish bin between the tennis courts and Smith Street.

We have an election coming up. We seem to be having some high cost projects being mooted in the dying days of the current council to what, raise awareness? Improve current members profiles? It seems that the current council is all for the perception of growth and projects, but if they haven't consulted with those affected, if they haven't budgeted correctly, if they haven't researched real needs and possible outcomes properly, it will all result in a ridiculous waste of money. Let's all stop and take a few deep breaths and really look at projects like this and the bypass that ends in a T junction in Cavenagh Street (!!) and see if there aren't better ways to improve our Darwin Lifestyle with the $100 odd million dollars that appears to be on the table.

Just because the money is available, Council doesn't have to spend it before the election.

Subject: lighting of ovals
Date: Friday, 28 July 2017 at 4:46:57 pm Australian Central Standard Time
From:
To: jo@truenorthcomm.com.au

Dear Jo,
My residence overlooks the ovals that the NYAFL are looking to light up. This will interfere with my privacy and I am totally opposed to this occurring.
The NTAFL have ample oval access at Mararra and additional lighting there would in my opinion provide a solution to your needs into the foreseeable future.
Please forward my objection to your CEO Mr Michael Solomon.
I am in support of Mr position.
I would appreciate a reply.
Yours truly.

Subject: Re: Consultation with extended by two weeks

Date: Monday, 31 July 2017 at 7:55:02 pm Australian Central Standard Time

From:

To: Jo Madin

Hi Jo,
I was just wanting to run something past you and feel free if you are unable to answer.
At the meeting last week both the members from cricket and AFL clubs seemed to voice their concern
that they would not be able to utilise the lights due to costs.
What is the motivation for the lights if the two clubs they are supposed to be for are unable to use them due to cost.
Could the money not be better spent on other sport support options.
Also if cost is a paramount issue for the clubs why are there no provision for solar panels on the lights.
If no one can afford to use them why bother to install them?

Just my thoughts
Regards

------ Original Message ------
From: "Jo Madin" <jo@truenorthcomm.com.au>
To:
Sent: Friday, 28 Jul, 2017 At 7:51 AM
Subject: Consultation with extended by two weeks

Good morning

I wanted to let you know that the consultation on lighting Gardens Oval 1 has been extended to 11 August. This gives you and your neighbours and others interested in the proposal more time to consider it and provide feedback.

I ask that you pass on this information to your network.

Feel free to contact me to discuss. Enjoy this beautiful long weekend!

Kind regards, Jo

Sent from my iPhone

Subject: Re: Consultation with extended by two weeks
Date: Tuesday, 1 August 2017 at 3:33:48 pm Australian Central Standard Time
From:
To: Jo Madin

Hi Jo
I am happy for you to include my comments.
There are so many needs in the junior and senior sporting areas that I believe it is important
any funding options are scrutinised thoroughly to ensure it gives maximum benefit
Regards

------ Original Message ------
From: "Jo Madin" <jo@truenorthcomm.com.au>
To:
Sent: Tuesday, 1 Aug, 2017 At 12:57 PM
Subject: Re: Consultation with extended by two weeks

Hi

You make some very good and valid points; I will see whether I can find some answers for you. I would also like to treat the points you raise below as a submission to the consultation process which means I will include them in the consultation report. Please let me know if you are happy for me to do this.

I hope you're well?

Kind regards,

Jo Madin Senior Consultant
True North Strategic Communication
Ph: 08 8981 6445
Mob: 0448 656 668
Email: jo@truenorthcomm.com.au
<applewebdata://84D1376B-CE3A-4E59-B5F5-26A67CD2E57D/elena@truenorthcomm.com.au>
www.truenorthcomm.com.au <http://www.truenorthcomm.com.au>

On 31/7/17, 7:55 pm,
wrote:

Hi Jo,
I was just wanting to run something past you and feel free if you are
unable to answer.

At the meeting last week both the members from cricket and AFL clubs
seemed to voice their concern
that they would not be able to utilise the lights due to costs.
What is the motivation for the lights if the two clubs they are supposed
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Regards

------ Original Message ------
From: "Jo Madin" <jo@truenorthcomm.com.au>
To:
Sent: Friday, 28 Jul, 2017 At 7:51 AM
Subject: Consultation with extended by two weeks

Good morning

I wanted to let you know that the consultation on lighting Gardens Oval
1 has been extended to 11 August. This gives you and your neighbours and
others interested in the proposal more time to consider it and provide
feedback.

I ask that you pass on this information to your network.

Feel free to contact me to discuss. Enjoy this beautiful long weekend!

Kind regards, Jo

Sent from my iPhone

Subject: Re: Objection to 4 X 32m Lighting Towers on Gardens Oval No 1. 600 Lux
Date: Wednesday, 2 August 2017 at 4:00:53 pm Australian Central Standard Time
From:
To: jo@truenorthcomm.com.au
CC:

High

Priority:

Attachments: golf lights 2.jpg, golf lights 3.jpg

Dear Jo

RE: Objection to 4 X 32m Lighting Towers on Gardens Oval No 1. 600 Lux

I am writing to advise my objection to the lighting that is to being proposed to be installed at the Gardens Oval.

My reason for the objection is that my husband & I will no longer have the same opportunity and rights as everybody else of being able to retain our quality of life in our home that is on the escarpment looking over the gardens, gardens oval and surrounding area because we would than have these very large light towers illuminating the Gardens Oval 6 days a week shining into our apartment.

Should the Garden Oval proposal be accepted then other facilities who have had the proposal denied will be able to submit a proposal also for lights which would then mean you have two large areas operating high powered Light Towers that are producing large amounts of Light pollution. The light does not only shine down it also eliminates upwards, as is evident that you can see the Light Towers at Marrara Sports complex when in operation.

This would then cause a lot of discomfort to residents living in the surrounding High Density Residential zone area.

I do not think that this would then be fair and just, as we should be entitled just like everybody else to be able to come home to enjoy peace & quite whether it be watching TV or sitting outside on our balconies with out the above intrusion of lights 6 days a week and also to take into consideration the sleep deprivation side of it.

The surrounding area's around the Gardens Oval is also very unique that not only is it one of the small green space's left within the Darwin city it is also most importantly home to a number of wildlife and fauna that would be effected by these lights.

No matter what people say operating these lights from 6 pm to late 6 days a week will be a huge intrusion on the quality of our life's and will also have a huge effect on the wildlife and fauna at night time.

It has already have strongly expressed No to the lights being installed previously when Mr. Dee has tried to pass it through council for the Gardens Link Golf for the reason that have been expressed above.

I have attached photos of the proposed light tower that was erected on the golf course as an example for public and residents to see what the light tower would be like, these photos show how powerful these lights are, the Gardens Oval is only across the road from the Gardens golf course and will generate the same effect with light towers.

The first photo is off my balcony and the second one is from inside my lounge room.

We also had a number of Alderman including the Mayor come and view the effect the proposed light tower generated from the Gardens Link Golf course at the time. A number of them agreed that the light generated was intrusive.

Golf Lights 2

Golf Lights 3

Subject: Bus Excursion to Palmerston Stadium

Date: Saturday, 5 August 2017 at 7:23:30 pm Australian Central Standard Time

From:

To: Jo Madin TRUE NORTH

Dear Jo,

I'm interested in joining the bus excursion to the stadium at Palmerston on Wednesday evening.

I live on the top floor of Larrakeyah. Our building overlooks the Gardens Park Golf Links and is three storeys high.

While we don't have a direct line of sight to the Gardens Oval, if these lighting towers are 32 metres high (as has been proposed) we will definitely be impacted by the lights each evening.

I have an even greater concern for the residents in Warrego Court, Myilly Point and Hastings Over Mindil. As they enjoy an elevated view of the oval, they will be severely affected.

I would be grateful if you would note my objection to the Gardens Oval lights in your consultation report.

Thank you,

Subject: Gardens Oval Lighting Proposal

Date: Monday, 7 August 2017 at 5:23:39 pm Australian Central Standard Time

From:

To: jo@truenorthcomm.com.au

CC:

Hi Jo,

As a resident at Larrakeyah, I am very concerned about the Gardens Oval Lightening Proposal.

I only just recently found out about it. I'm not sure there has been very much widespread community knowledge about this proposal.

I really am not sure why this area of Darwin (Oval, Golf Course and Botanical Gardens... A green belt area in Darwin) is always under pressure in some way!

There is already lots of very bright night lightening coming from the oval area as I need to put the shade down every night in our bedroom to sleep (it faces the oval).

I am not sure that the environmental impact from the proposed lightening output could ever be properly regulated! Especially that brightness and due to the extreme height of the towers. This' green belt ' area is really a very special spot! It is an area that gives real character to Darwin.

These lights seem way over the top ...literally!

Not only will these lightening towers be a real eyesore , but there will also be an impact from this kind of lightening on our local nocturnal wildlife.

We really need to be putting all efforts into beautifying the place not making it less attractive!

Kind Regards,

Subject: tennis court lights

Date: Wednesday, 9 August 2017 at 11:06:10 am Australian Central Standard Time

From:

To: jo@truenorthcomm.com.au

Attachments: IMG_0617.JPG, IMG_0624.JPG

Hi Jo,
Hope these help.
Kind Regards,

Subject: Gardens Oval Lights
Date: Wednesday, 9 August 2017 at 3:53:21 pm Australian Central Standard Time
From:
To: jo@truenorthcomm.com.au
CC:
Attachments: Golf Course Lights.jpg

Hello Jo

We object to the proposal to install four light towers on Gardens Oval Number 1.

As residents on the seventh floor of Reveen Apartments located on the corner of Gardens Road and Dashwood Crescent we spend most evenings on our balcony enjoying the nice view to Mindil Beach over the golf course and the ovals. Our objection is the light pollution that will adversely affect the pleasant ambience of our apartment which was an attraction when we purchased the place seven year ago.

In 2014, the Gardens Park Golf Course installed 12 metre high light towers to illuminate Hole 1 on a trial basis but have recently been used to facilitate a *$100,000 Hole-In –One* competition on Friday evenings. The lights are extremely bright as evident from the attached a photograph taken from our balcony. The very bright light in the centre of the photograph illuminates the tee on Hole 1. Gardens Oval is situated just to the right of this bright light which dominates the image and is much brighter than the nearby street lights on well-lit Gardens Road in the foreground. The golf course lights are fitted with shades that are supposed to mitigate the upward spill of light but are not effective as evident from the photograph.

Due to the basin topography of the area and the surrounding land use, Gardens Oval is totally unsuited for intense lighting from 32 metre high towers as proposed. Medium and high rise residential buildings occupy the higher ground surrounding the low lying oval. The glare from the upward light spill is excessive. Many residents will be affected by light pollution night after night but this would be of no concern to supporters of the lighting who for the most part do not live in the area.

The funds required to light Gardens Oval should be spent on a location where there is minimal residential development or at least where the residences are at a similar elevation to the oval such that impact of upward light spill is minimal.

Subject: gardens oval lights
Date: Thursday, 10 August 2017 at 8:55:10 am Australian Central Standard Time
From:
To: jo@truenorthcomm.com.au

Good morning Jo,

After last nights visit to Palmerston oval it was clear that at a height as seen on the drive back to Darwin, there is brightness from the lights and it will be seen and impact on the surrounding apartment complexes.
If the lights are not required for competition play is it not possible with all the new technology that is happening, for lights to be place just below the tree level and still provide the necessary light across the oval for practice. For safety and protection perhaps a perspex shield could be installed in front of the lights. This would possibly stop the glare and may just allow a mist of light over the trees.
As I mentioned it really is important that a trial be done so residents can actually see what the impact is going to be. If Council go ahead with the proposal I do not believe it could be turned back. So with the tennis court lights which are facing down but still glare out to the apartments and then the oval lights which will be seriously more powerful this area could become untenable for residents and it is a residential area not a commercial or recreation precinct.
I would strongly urge that a trial using a crane with a generator and one of the proposed light frames, this could be moved to the four locations at the two heights 32m and just below tree line and people can then make an informed decision.
Because after last nights viewing I find it even more difficult to support the proposal.
Regards

Subject: RE: Confirmation - Bus trip to Asbuild Oval
Date: Thursday, 10 August 2017 at 9:15:40 am Australian Central Standard Time
From:
To: 'Bridget McCue'
CC: 'Jo Madin', 'Sheree Jeeves'
Attachments: image003.png, image004.jpg, image001.jpg

Good morning Jo,

& I would like to thank you for the tour of Palmerston Oval.
The lights are very impressive.
I am worried and concerned to have such an infrastructure at the Gardens Oval.
It will put pressure on the council to expand the Oval to accept a great capacity for usage of AFL members.
It is also unfair that the Oval will be used only for the AFL members.
That whole idea of greater usage of the Oval is the wrong message.
It will destroy the fauna that does exist there and should be protected for the future of Darwin.
Pressure has been in the past like Hotel development, Lights at the Golf Club.
I am sure the greed of mankind will not stop.
I hope the members of the Council are strong to support the status quo for the future of Darwin.

Kind Regards,

RE: Lights at Gardens Oval No.1

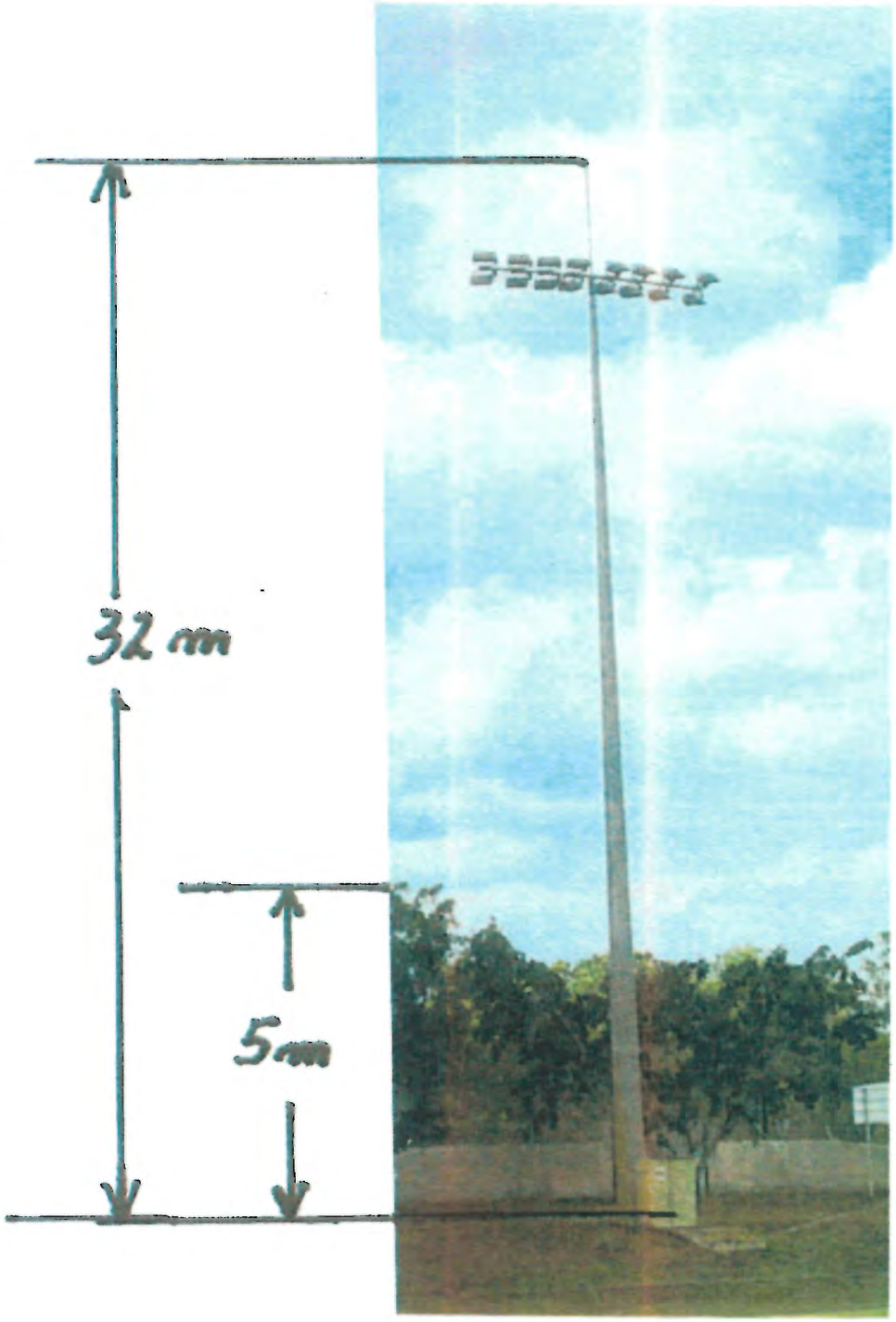
8th August 2017

Further to my objection of the 27th July, find following:

I am concerned, not just for the lighting, also as a rate payer. In the long term, that the rate payer will have to carry the responsibility.

My questions and concerns are:

- Is there an environmental report?
- Is there a pollution report?
- Is there a noise report?
- How many trees will have to be removed?
- Who pays for the maintenance and the electricity as it is very close to the sea and salt water will create damage to the steel structure?
- The structure is for the long term – for many years to come what is the costing for maintenance – I'm sure there are other issues?
- Where is the respect for the creatures that live in the gardens?
- Does the council accept this is a foregone conclusion?
- As a rate payer and resident of Larrakeyah I do strongly object to have lighting at the Gardens Oval No.1.
- Would the rate payers accept a Class Action against the council?




From the birds and creatures – where should we move to ??

Subject: Fw: Proposal for lightsat Garden City Oval
Date: Friday, 11 August 2017 at 4:39:31 pm Australian Central Standard Time
From:
To: Jo Madin

Hello Jo

As a resident living near the Gardens City Oval - myself and my family would be directly affected by the proposed lights installation at Gardens City Oval.

Initially in June I had provided feedback as a resident via the online link on the Darwin Council website - initially I had considered this option with the use of shrouds to minimise the radiant light to the surrounding area.

Following the demonstration on Wednesday night 9/ August of how these light will appear - as organised -

I have actually changed my opinion and definitely want to give the feedback that the installation of shrouds on the proposed lights will NOT solve the radiant light issue to surrounding residents and will definitely negatively affect those living in the entire area.
So I would lie to make it clear that I would be voting NO to the installation of lights at the oval.

If you can please confirm receipt of this email and ensure that my position on this matter is updated to be NO to any installation of lights.

Thankyou

Subject: Gardens Oval Lights Proposal, Residential Neighbours concerns and objections.
Date: Friday, 11 August 2017 at 1:19:07 pm Australian Central Standard Time
From:
To:

CC:

Attachments: Gardens Oval 1 Lighting Objection Rev 2.docx

Dear Candidates

We've still not really heard much in public response to an aspect which will impinge upon he amenity of peoples homes around the area of the Gardens Oval / Botanical Green Belt.

A cut and paste of a statement from our present Lord Mayor, which I trust that you would as candidates hope to adhere to.

"Although Council is limited in its powers and ability to control town planning or urban development, it will advocate on behalf of the community and will focus its attention on matters it can control. While we are always mindful of achieving the best outcomes for the people of Darwin, the challenge for Council is to balance the sometimes competing interests and needs of the community with the available resources and capacity to deliver on those interests and needs"

Our concerns are, that again funds will be allocated to groups in a un-proportional manner which benefits those whom have a temporary interest in using a facility for a few hours a week against those who will live next door to it permanently. Already AFLNT, witnessed to change their stance/strategy pubic message delivery of justifying the demand for installing lights on the oval, which we also find concerning. Presently stated as for growing female and junior use, though only a while ago it was talking about using for all senior games under lights. More questions than answers for residents

Please find attached my objection which has been provided to the consultants for the purpose of the NTAFL & Cricket NT's submission to put 4 X 32m, 600 Lux Lighting towers on the Gardens Oval.

For comparison, if your were familiar with it. Richardson Park Rugby field only ever had 200 lux

Many of us in the High Density Zones Residential area's, are concerned due to a raft of aspects. We already have a large growing working group, which will represent 100 or so rate paying properties at this stage. Residents, tenant's and investment property owners. Word is still spreading whom will necessary take the fight through the courts if in fact council vote to let the Lighting towers be built.

It is farcical to think that this initiative will bring any life back into the CDB, sporting participants will be hot and sweating then go straight home.

Facility users will have their activities for a few hours, then get to return home. Meanwhile we put up with lights 6 nights a week a year until 9pm

I'm away for the next month, though able to chat via email if you have any further questions.

Publicly available Council links bellow

https://www.darwin.nt.gov.au/council/have-your-say/open-consultations/lighting-gardens-oval

https://www.darwin.nt.gov.au/council/about-council/publications-and-forms/lighting-gardens-oval-fact-sheet

Additionally I'l willing to chat with anyone at any time, if necessary bring them into my home so they can see first hand, in the same manner as we did with the last council in 2014.

Kind Regards

Objection to the consideration by the AFL Northern Territory (AFLNT) & Northern Territory Cricket (NT Cricket) - Installation of 4 light poles (32m) on Gardens Oval No 1 with a maximum brightness of 600 Lux

As the owner and resident of , Larrakeyah. Additionally as the owner of , Larrakeyah. I would like to inform you that I have recently reviewed the documentation & presentation related to the development proposal and request that my submission is tabled for discussion at when submitted as a part for the report to City of Darwin

I am objecting on the grounds of;

1. **Lack of transparent "Independent" community consultation to date**: By management of the Gardens Oval, Cricket NT & AFLNT to know how it will or won't affect my properties. As with other nation wide and international proposals, physical lighting spill test and then subsequent community consultation, by means of computer generated graphics only are insufficient. We as residents in the vicinity, of the Gardens Oval, are hardly been given tools or proper experience, or abilities to fully understand how the development may affect the enjoyment of our own homes? 32m meter tall lighting towers which are TRIPPLE the height of the existing 8m ones on Gardens Golf Course Hole 1

2. **City Of Darwin Policy 025 – Community Engagement:** Instance I clearly recognizes that this facility is for community use. Though many, myself included, as a local ratepayer and a non user(s) of the facility are the ones whom will be adversely affected. Council and the proponents of these lights need to understand that we need to be engaged properly as residents with a vested interest in the specific radius of the proposal. We have a democratic right for our voice to be heard, as will be the ones continually affected by this proposal.

3. **6 Day usage of the Facility:** This is a lot of usage, this will have an impact on the amenity of how we use our own homes. I applaud Cricket NT & AFLNT on their promotion of youth and females in their fine sports. Though in this case people will be coming in for a few hours a week to train, children, adults males and females that I all understand. Meanwhile we are residents will be affected by this proposal 6 days a week. Affected by light 6 nights a week until 9pm

4. **Inability of Gardens Oval to even manage their present lighting spill:** For many years, neighbors and myself have attempted to make contact with the correct and appropriate persons, with no success. By means of phone, email and even dropping into Gardens oval to see if anyone could adjust floodlight fittings which are installed as car park lighting, as they for more than 6-7 years do already point into our properties. There isn't even a mechanism for us to be able to have this relatively simply resolvable issue attended to. So I do fear how any future concerns will be dealt with.

5. **What mechanisms with the City of Darwin provide us with dealing with any complaints for obtrusive lighting?:** Presently the city noise pollution complaints system doesn't function to the satisfaction or with any ability to resolve issued in measurable manner, what present mechanisms does the Gardens Oval & City of

Darwin propose will be set up to deal with any such issues that will likely arise in the future? Already, with out the consent or approval process of the Development Consent Authority, Gardens Golf Course due still use the lighting towers on Hole 1, even though there initial use period was only for one year, as per the consultation process determined by the City Council. In this manner, both the City Council and NT Government departments have been derelict in their duties. Though as residents, again it falls upon deaf ears and nothing is followed up or resolved, again lights on at undefined times, no prior notice and affecting neighbors. Control measures were apparently in place, though again it seems they aren't in effect nor are they enforced or properly policed. Council owned land? he doesn't have DCA approval to use them... Though he continues to use them?! This has been ongoing since 2014!

6. **Gardens Oval Proposal's failure to consider the physical impacts upon adjoining properties:** That I fear the planning proposal is failing to take into consideration that many of the affected properties are indeed further in distance Gardens Oval, though as residences are located in high-rise buildings, upon the escarpment over looking the golf course so we are indeed affected. It is the premises of *Smith Street, Warrego Court, Beagle Street and Houston Street & Salonika Street* who are all greatly affected by this proposal. I would estimate that at least 45 of the elevated level properties on the Smith Street, Warrego would be in line of sight of the proposed lights on Oval 1. I have no immediate first hand information of how many more properties would be affected, though wouldn't hesitate to say there are more. Photos detailed in the appendix, estimate it would be 650-800+ rate paying properties.

7. **Increasing probability of functions on the Oval:** Over the past few years we have witnessed numerous functions whereby Oval 1 has been lit up for functions in some instances over night, I believe "Relay for Life". It is in fact noticeable with in our own apartment spaces, acceptable though as the functions are infrequent. Though I am objecting to an increase in frequency of such functions due to the disturbance as already believe there are amply function facilities available in the Darwin vicinity which could be better utilized for children's training in area's closer to were said children live, there are plenty of school ovals around Darwin City which will would cost a lot less to light and would be mores suited to smaller and more cost effective proposals

8. **Nuisance of Light Pollution:** I do see the installation of lighting on Oval 1 as setting a precedent for lighting the rest of the facility, namely being Oval 2, *We are fearing the obtrusive sights of "Islands of light" in an otherwise darkened area, disturbing our evening visual amenity*. As the consultants have stated there has been a marked increase in NTAFL participation, so when then if numbers continue to increase would they also want to do Oval No 2?

9. **Elevation and view of the adjoining course properties:** My properties are located on the escarpment above the course, in the upper levels of the building. My living areas and bedroom sides of the property and entire look balcony out over the course, so any activities on Oval 1 & Oval 2 are directly in my view. *Like most apartments in this area, as it is difficult to look into our living area's, we don't have any curtains on that side of the building, aspects of which influenced my decision to buy my property so each evening we can enjoy the outside night view. Though it will*

be difficult to determine, the obtrusive nature of the spill lighting will definitely have both a physiological and physiological affect on how I sleep and reside in my own home.

As previously witnessed by the golf course lighting proposal, which on hole one only had two light fittings on three 8 meter tall pole's, The MasterPlan NT report only detailed to the DCA the properties adjacent to Hole 1, even though we are 400 meters away across the lake, and in clear view, we are the ones affected as witnessed by the Lord Mayor and other councilors whom attended a demonstration with in my own property, we were severely affected by the small measure of these lights which are a minor percentage of effect presently being proposed.

10. **Organized sporting functions/training evolving into continual disturbance:** That I already witness and hear the noise from the ***Golf course***, Evening functions and day time use. ***Mindil Beach Markets***, ***Tennis courts***, ***Casino Lighting***. The present proposal is a marked and ***massive increase of obtrusive lighting***. I do not wish to reside in an area where these activities are ongoing, as it will affect the peace and enjoyment of my own and neighbor's residence, the places which we call home.

11. **Lighting installation benefitting the leaseholder, sporting clubs only:** That the Oval is public land, owned by the residents and ratepayers of the City of Darwin, I don't wish to see it commercialized in a manner simply to benefit a leaseholder whom will likely raise further funds from expanded activities. (Present sporting club) which has been bankrolled out of funding black holes (by council as let off when not able to pay council rent fee's) in the past and already has a clubhouse, licensed facility which struggles to attract clientele

12. **Preservation of Darwin's Green Belt:** Others and I wish too see the Darwin City green-belt park land preserved as a day time recreational space only; objecting to any possible increase of nuisance behavior which may created by ongoing evening activities and will possibly seek to place a perpetual injunction on such future lighting development proposals.

13. **Lighting proposal of hole one, and the applicants pursuant of lighting off all nine holes will exacerbate existing local lighting disturbance:** We are already affected by the light spillage and noise from the Casino flashing entrance signs which is approximately 400 m away, not to mention the venues afternoon/ evening music, concerts and ongoing functions, landing and take off by Helicopters. The tennis courts lighting, which are also more than 400 meters away, already affect us by means of causing an Island of light in an otherwise darkened area, though tolerate this and appreciating and supporting the communities pursuits of physical and social activities, as it isn't 363 days of the year.

14. **Environment 1:** I am concern for the flora and fauna aspects of the course, due to the ongoing lighting of the course and do not believe that the *Department of Lands, Planning and Environment* have properly evaluated the situation, concerning the abundant movements of native nocturnal species with in the vicinity which nest or use the grounds of the adjacent Botanical Gardens nature reserve area, wildlife with the in the wider & recognized *'Gardens/Mindil Beach Area green belt'*.

15. **Lighting will be shielded by trees, future loss of trees?:** I heard it said that we will be shielded from a lot of the light by green foliage / tree etc's. That is fine until we have a decent wind gust (Cyclone) and it takes years again for the tree's to grew back.

16. **Evasive lighting and noise of activities:** The light will still spill from activities of night activities and will clearly be in prominent view from my premises, especially noticeable in the evenings, which will impinge on the use and enjoyment of my own property. We already hear the afternoon training exercise drills, person's voices and whistles, ect. Fine with that as it is. But not 6 nights a week until 9pm.

17. **Residential Property Values:** Property values across Darwin have already dropped markedly, if this proposal were to go ahead I have no hesitation is saying it would be detrimental to future sales, it would definitely have an affect upon future property prices.

I also disagree with any refusal, or statements, which infer to be impractical to install a temporary lighting structure to see how neighbors would be affected. As this is the only manner of how the proposal can be properly gauged. As we saw by the Gardens Golf Course Lighting, the computer generated spill reports were hardly worth the paper they were printed upon, only by a live lighting experience was this in fact witnessed and agreed and subsequently upon. Maybe the whole proposal requires lower lighting towers with less ambitious lighting levels. 12m towers and 100 Lux maximum. For training purposes only.

Conclusion: Great proposal & initiative by Cricket NT & AFLNT. But in this instance it will only have too much negative impact upon to many adjacent residents with in the greater Darwin CBD area, High Density Living Zoned areas. I estimate 650+ properties will be impacted 6 nights a week. Though this proposal isn't suitable for Gardens Oval No 1. An alternative facility should be utilized, where less local rate paying and/or residents are affected. Spill reports and computer generations alone don't provide a realistic indication of lighting impacts for the local residents. It would provide and would comply with the measures of consultation as identified by the Darwin City Council in other proposals. It would also identify the issue *too those who might not be presently aware to the extent of the present proposal through the notifications as required by aspects of the planning act.*

Sincerely.27th July 2017

Master of Business Administration (Oil & Gas): Middlesex University (2013) **Advanced Diploma of Marine Engineering**: Hunter Institute of Technology, NSW. (2007) **Qualified STCW95 Chief Engineer** (Marine Engineering) Unlimited Tonnage/Kilowatt as awarded by the Australian Maritime Safety Authority. **Electrical Workers License:** A 5097, as issued by the Electrical Workers & Contractors Licensing Board, Northern Territory.

Appendix Item 1: Looking from Building 2 Warrego Court over Hole 5, along fairway 6 & 7, which highlights how close the buildings on the escarpment are to course

activities. lighting proposal will create obtrusive islands of lighting in an otherwise unlit area.

Appendix Item 2: Looking from Warrego Court towards Oval 1, on the left side of the photo in clear view from our building.

Appendix Item 3: View from Fairway No 1 looking towards Smith Street & Warrego Court. Identifying that at least 30 apartments from this aspect alone have a clear and unhindered view across the treetops of the proposed lighting area of Oval No 1.

Appendix Item 4: View of neighboring buildings, photo taken from the tee off area of Hole 7 adjacent to Oval 2. Clearly indicating that many of the high value residential apartments have a clear view of the Oval 1.

Appendix Item 5: Looking from Tee off No 2, along the fairway at the C2 & C3 buildings on the Esplanade and the new Smith Street building, which will also be exposed to the evening lighting. From walking around and viewing the proposal from various vantage points, I would estimate that at least 400 present or future rate payers apartment's will be affected by this Gardens Oval No 1 lighting proposal

exposed to the evening lighting. From walking around and viewing the proposal from various vantage points, I would estimate that at least 400 present or future rate payers apartment's will be affected by this Gardens Oval No 1 lighting proposal

View from the Darwin High School hill which gives a better understanding of the proximity, as many other photos are from Iphone and don't have the same special impact

Appendix Item 6: View from Warrego Court, over to Oval 1 and taking in the Hastings Development. These residents and property owners will also be affected, as it will be smack bank in the middle of their prime view.

Subject: Re: Bux Excursion to Palmerston stadium
Date: Sunday, 13 August 2017 at 1:46:10 pm Australian Central Standard Time
From:
To: Jo Madin

G'day Jo,

I support the views of expressed in his submission.

Further Trust is a major issue for me.

1. Councillors or would be councillors I have spoken to all say they support lighting up the ovals. The first excuse for so doing was by, all bar one, that it would deal with the problem of the "riff raff". The council is not the police force and I cannot believe those I spoke to genuinely believe that lighting the ovals will solve the problem. It will only move the problem to somewhere else.

2. See the NT News article September 14 2016 by Marc McGowan entitled Darwin City Council approve AFLNT and NT Cricket's application for lights at Gardens Oval - AFLNT Boss states "My discussions wih the Government were very good including ERECTING MATCH LIUGHTS TO 100 LUX...." So initially you get in principle agreement with something light on then you morph it into what you really are after. So sure as hell going to morph into 5000 lux for national & international standard matches in the near future.

3. See The Sports Field 2016-2026 City of Darwin document which categorised this oval as a Regional facility thus enabling the Councillors to make decisions which will elevate this oval to premier standard for competition at elite level for residents beyond Darwin – a document which appears to address the needs of elite sporting bodies without consulting with and to the detriment of the general public. Particularly those whose amenity might be affected by noise and light pollution caused by such elevation from a picnic type casual community use of land to premier elite use which leads to excluding those not premier or elite activities.

4. The report submitted to the council by the NTFL & NT Cricket entitled Report on a New Sports Lighting Installation for Gardens Oval No. 1 Doc No D478=RPT-001 Project No D478 Project Title Gardens Oval Sports Lighting lists stakeholders involved in the preliminary design process as

City of Darwin Council

AFLNT

NT Cricket

True North Strategic Communication

True North is a stakeholder and yet the community is not! This illustrates the community will be the last to know when the Council, the AFLNT and NT Cricket get together in the future to further morph this oval into a premier elite facility with super luxed lighting.

5. The bus trip organised to look at the Palmerston lights further entrenches mistrust in all parties concerned with this consultation process. We were shown lights with 6 poles with only 8 lights per pole (32 lights) at 100 lux and no definitive response to questions of height but possibly up to 28 m from a ground level aspect. Resident affected are going to endure 80 lights on 4 x32 m poles (20 lights per pole) at 600 lux in houses that at 15m plus higher. Not a comparison which engenders trust in those that conceived of this demonstration to show us what we might endure.

6. The argument that playing members have expanded such there is a shortage of training grounds can & no doubt will be used in the near future to argue for even more lighting and use of oval 1 which decision to so allow can be readily made by Councillors pointing to the document The Sports Field 2016-2026 followed by an expansion into the oval adjacent to Oval 1 and of course be used as a precedent by the owner of the golf course Lease.

Instead of a Gardens Precinct (Mindil, Casino, Little Mindil, Tennis Courts, Ovals & golf course) the community will end up the proud owners of 50+ hectares fully lit up – likely a legacy able to be seen from space.

On Mon, Aug 7, 2017 at 12:03 PM, Jo Madin <jo@truenorthcomm.com.au> wrote:
Great thanks I'll let you know Tuesday / early Wednesday the pick up point.

Kind regards, Jo

Sent from my iPhone

On 7 Aug 2017, at 11:23 am, _ wrote:

G'day Jo, & I would like to join the bus excursion.
Thanks...

Submission 21

Monday, August 28, 2017 at 1:20:30 PM Australian Central Standard Time

Subject: Re: Gardens Oval Lights & Heat Stroke Issues
Date: Sunday, 13 August 2017 at 2:50:49 pm Australian Central Standard Time
From: Jo Madin
To:
CC:
Attachments: FFNT Hot Weather Policy 2016.pdf, Data analysis for FFNT Hot Weather Policy - 2015 Dry Season WBGT and App temps - February 2017.xlsx, Lighting GO1 Letter.pdf

Hi Jo

Please accept this email as a submission from Port Darwin Football Club for your report to City of Darwin regarding the public consultation for the project 'Lighting Gardens Oval'.

Attached are 3 documents.
1x Letter detailing the position of Port Darwin Football Club, co-signed by Football Federation NT
1x FFNT's Heat Policy
1x Spread sheet comparing Heat Policy recommendations against actual temperatures during 2015

Should you require any further information, please contact me by return email.

Regards

PO Box 39167 Winnellie NT Australia 0820

Friday, 11 August 2017

Attention City of Darwin
C/- Jo Madin
True North Strategic Communication

City of Darwin Lighting Gardens Oval Proposal – August 2017

I write in support of the proposal to install lights at Gardens Oval to provide for night time sports.

I'm the team manager of the Port Darwin Football Club 18s 'Tigers' team and over the course of my 10 years+ involvement in the club, I have developed a working understanding of the issues of heat risk for children in sport, and heat management requirements for sports administrators.

Sport is played in Darwin under hotter and more humid conditions than most other places in Australia. This represents challenges for sporting administrators, not the least of which is the appropriate scheduling of game times.

The Football Federation NT (FFNT) released its revised Heat Policy in July 2016, which provides guidelines for the scheduling of matches in relation to the wet bulb globe temperature (WBGT) forecast. The attached policy refers.

The football season in Darwin generally runs from April through to September.

If FFNT were to follow its own Heat Policy, then there would be no football scheduled at any time of the day during April and September, and very little football able to be scheduled during day light hours during May and August. The attached data analysis refers.

What has become obvious during my investigation of this matter, is that if sports administrators in Darwin (and beyond) are to take heat risk and their duty of care to players and other participants seriously, then they need to amend their game schedules to accommodate more games during cooler times of the year, and cooler times of the day.

To support these changes to game schedules, sports grounds around Darwin (and beyond) will need to be provided with lights to support more night time matches (and training sessions).

Sports administrators cannot ignore the very serious risks posed to players and participants associated with the heat and humidity in Darwin and councils and grounds/venue owners/managers need to play their part in providing suitable facilities to support the safe conduct of sport in Darwin (and beyond).

Trevor Durling
Coach/Team Manager
Port Darwin Football Club

Alison Alber
President
Port Darwin Football Club

Bruce Stalder
CEO
Football Federation NT

FOOTBALL FEDERATION NORTHERN TERRITORY

Reviewed April 2016

HOT WEATHER POLICY

1. Responsibility

1.1 Football Federation Northern Territory and its registered Clubs and members have a responsibility to ensure the health and wellbeing of players, team and match officials, staff, volunteers and spectators.

1.2 The FFNT Hot Weather Policy will assist players, team and match officials, staff, volunteers and spectators to undertake the necessary action in cases of extreme hot weather, in order to prevent injury through heat related effects.

2. Risks

2.1 Football Federation Northern Territory recognises that the risk of an elevated body temperature from high intensity sport in a hot environment is significant, and can lead to heat illness presented as heat exhaustion and heat stroke.

2.3 Sports Medicine Australia (SMA) characterises heat exhaustion symptoms as a high heart rate, dizziness, headache, loss of endurance and skill, nausea, clammy and pale skin, and collapse.

2.4 Heat stroke is similar to heat exhaustion but with symptoms that include dry skin, confusion, collapse and possible coma. It may present as an increased risk for a player who is suffering from heat exhaustion but has persisted with exercise.

This is a potentially fatal condition and must be treated immediately.

3. Factors

3.1 FFNT recognizes that there are a number of factors that may affect participants during days of extreme heat, including humidity, duration/intensity, timing (especially between 11am and 3pm) hydration, fitness level, age and gender.

3.2 Physiologically, women, children and the elderly may suffer more severely from the effects of heat during exercise.

4. Competitions

4.1 The Competition Administrator shall check the WBGT (Wet Bulb Glow Test thermal comfort) temperature forecast prior to every competition match day, as published by the Australian Bureau of Meteorology at www.bom.gov.au , which shall be the official reference for forecast temperatures as outlined within this policy.

4.2 Where the maximum temperature is forecast to reach between 30 degrees Celsius and 33 degrees Celsius WBGT during junior and women's competition matches or between 32 degrees Celsius and 35 degrees Celsius WBGT during senior men's competition matches, the Coach of each

team may agree together to request a discretionary drinks break with the match official (Referee). In order for the drinks break to take effect, both Coaches must confirm their agreement for this discretionary drinks break to the match official (Referee) prior to the commencement of the match. The drinks break should not exceed 2 minutes duration. The timing of the drinks break is at the discretion of the match official (Referee) but it should occur, wherever possible, near the middle of each half.

4.3 Where the maximum temperature is forecast to exceed 33 degrees Celsius WBGT during junior and women's competition matches or 35 degrees Celsius WBGT during senior men's competition matches, a mandatory drinks break shall be enforced by the match official (Referee) during each half of the match. The drinks break should not exceed 2 minutes duration. The timing of the drinks break is at the discretion of the match official (Referee) but it should occur, wherever possible, near the middle of each half.

4.4 Where the maximum temperature is forecast to reach or exceed 36 degrees Celsius WBGT during junior and women's competition matches or 38 degrees Celsius WBGT during senior men's competition matches, the Competition Administrator shall review the following opportunities to;

1. reschedule matches to cooler parts of the day in order to conclude matches before 11am or commence matches after 3pm, or
2. reschedule matches to alternative dates, or
3. delay the commencement of a competition match(es) until the forecast temperature has decreased to a temperature suitable for the commencement of play, or
4. where extreme hot weather conditions persist, competition matches may be cancelled outright.

5. Training

5.1 Coaches and team officials should reference the Competitions section of this policy to assist with planning the intensity and duration of training sessions being performed within hot weather conditions.

5.2 Where the maximum temperature is forecast to reach or exceed 36 degrees Celsius WBGT for junior age teams and women's teams or 38 degrees Celsius WBGT for senior men's teams, outdoor training activity in direct sunlight shall be suspended from occurring. The commencement of training sessions, with specific reference to outdoor training sessions in direct sunlight, should be rescheduled to take place during cooler periods of the day.

6. Club Requirements

6.1 During all competition matches and training sessions, Clubs shall ensure that there is an adequate supply of potable water for drinking and that an appropriate number of drink breaks are allocated throughout each training session.

6.2 During all competition matches and training sessions, Clubs shall ensure that water containers are accessible for their players, team officials and volunteers.
Note: During competition matches water bottles are not permitted to be thrown onto the field of play, instead water bottles should be handed to players from the side of the field.

6.3 Clubs shall make every effort to encourage their players, team officials and volunteers to drink fluids; prior to, during and after all competitions and training sessions in order to avoid dehydration during exercise and to rehydrate after exercise.

6.4 Team officials shall be responsible for monitoring their players during competition matches and training sessions, to ensure that they are fit to participate or to continue to participate within a match or training session.

6.5 Whenever high temperatures are experienced, team officials shall, wherever possible, direct players to a shaded area for players and team officials to rest during the half time break of competition matches.

7. First Aid Treatment

7.1 Players, team and match officials, staff, volunteers and spectators who present with symptoms of heat illness shall immediately cease any further participation or exercise. They should be directed to seek immediate first aid treatment, including Strip/Soak/Fan:

- Strip off excess clothing;
- Soak with cool water;
- Fan the face and body;

NOTE: placing ice in groin and armpit areas may also be helpful.

The first aid objective is to reduce body temperature as quickly as possible. After the provision of First Aid, the affected person should immediately be referred for further examination and treatment by a medical professional.

8. Additional Resources

8.1 Additional heat illness information may be obtained from Sports Medicine Australia www.sma.org.au

Email: 13 August 2017

Please note a spreadsheet was also provided with data analysis for FFNT Hot Weather Policy.

The spreadsheet can be provided separately on request as the file content is too large to incorporate into this report.

Subject: URGENT - PLan Submission on Council's Lighting Gardens Oval Consultation
Date: Sunday, 13 August 2017 at 6:58:34 pm Australian Central Standard Time
From: Apple-Mail=_217FAC63-ABFC-4A7C-8924-C2B8AFDD697E Margaret Clinch boundary=
To: Jo Madin, Jo Madin
Attachments: Microsoft Word - Gardens Oval Lighting Proposal 2017.rtf.pdf

13.8.2017

JO MADIN

True North Consultants

Dear Jo,

Here is PLan's considered submission on Council's Lighting Gardens Oval, No 1 Proposal.

Thank you for meeting with the group of residents recently at our office.

Regret the slight delay.

M A CLINCH
PLan: the planning Action Network, Inc

89271999.

PLan: the Planning Action Network, Inc
PO Box 2513, Darwin, NT 0801
margaret.clinch@bigpond.com

12.8.2017

Response from PLan to True North Consultants re the City of Darwin's Proposed Lighting of Gardens Oval.

Jo Madin,
Senior Planner,
True North Strategic Communication

Dear Ms Madin,

1. Thank you for inviting, our organization to make a submission to this consultation. PLan is particularly concerned with sustainability, and how planning affects the community and ordinary residents of Darwin.

2. We have made a special effort to make this submission. The initial closure dtae of 28 July, 2017, was extended to 11 August, 2017. Our submission is thus a day or two late. There have been a number of simultaneous consultations occurring, some unsettling planning matters to be dealt with by the community, the need for wider research, and the fact that PLan must operate with volunteers only, having been granted no funds for paid staff.

3. PLan makes the following points, observations, and submissions in respect to this City of Darwin Proposal:

(a) At first sight, the issue might be expected to be decided on the balance of numbers of responses received from those playing sport, compared with residents living nearby who might be affected by the proposed night lights. We wonder, for instance, whether the distribution of

information about the proposal was equally distributed, and how submissions collected.

Would it be true that the direct distribution of information to residents was very local, whereas many sporting clubs have probably let their members know directly and systematically ?

(b) However, this is no small issue ! Local residents have already let their feelings be known over earlier proposals for night lighting for sport. There was the golf course proposal, the high powered and prolonged CLP NT Government Richardson Park fiasco which would have even compromised the Ludmilla Primary School, and now the City of Darwin Gardens Oval promotion.

Residents have rightly insisted that having invested in their homes, they will not allow themselves, or their children to be disturbed nightly by invasive high level lighting, open air night sports activities, noisy traffic movements, and possibly parking problems. Such would be an invasion on their amenity.

(c) In respect to Gardens Oval No. 1, Cricket and Australian Rules Associations seek to use the oval officially with lights until 9pm, but probably longer, whilst people leave the grounds for at least six nights a week. They claim that 32 metre poles and up to 600 lux lighting will not affect local residents. This disturbance would be added to other night activities in the area regularly from the Mindil Beach markets, and at times from the Casino.

(d) Michael Solomon, CEO of AFLNT is quoted in the NT News on 14/6/2017 as saying:

'Making Gardens Oval 1 a night venue for training and games would help give local sporting clubs more flexibility.'

Giving sporting people another option 'more flexibility' is insufficient justification for driving local residents out of their homes. Residents believe it would create very serious unnecessary problems.

(e) Affected local residents point to NT Government policy for major sporting facilities to be established together at the special Marrara sporting precinct. Appropriate facilities, eg. stadiums, lighting, and turf maintenance; and professional sporting training expertise should be available there, supported by public transport infrastructure. In 2016, for instance, the NT Government decided that Rugby facilities be centred there at Warren Park, instead of at Richardson Park, where there are homes and a school are nearby.

(f) The estimated costs of installing the lighting system at Gardens Oval No.1 is $1,200,000. This does not include the cost of use and maintenance of the lights, of upgrading of seating and team facilities, and rehabilitating and maintenance of oval turf for the venue to be used for first class games.

(g) The CEO of AFLNT is also quoted in the NT News of 14.6.2017 as saying:

'Darwin is crying out for a new night sporting venue and Gardens Oval is the smart choice because its so central and iconic.'

This has a very familiar ring to it. Gardens Oval was the alternate fall-back venue chosen instead of Richardson Park by former Planning Minister Tollner, on the basis of its geographical position. He saw it as a way of providing yet another central venue to support CBD business, regardless of its practical capacity to support major events. This seems to deny real economic considerations, and would be a very expensive option for Council, and for its ratepayers.

(h) There appears to be another 'hidden agenda' here Few members of the public may be aware of the City of Darwin's new Sports Field Plan, 2016-2026. This document is so relevant to the present issue of the proposed night lighting of Gardens Oval. On page 3, by way of introduction, in her Executive Summary, the Lord Mayor states:

'Sports fields help facilitate physical activity participation; contribute to providing a social focus for the community and influence people's perception of of their neighbourhood. Quality facilities encourage broad community use and contribute to the overall sustainability and wellbeing of the communities in which they live.'

Few would disagree with that statement of the importance of sport especially to young people, and identification with neighborhood and community. But how will this Plan work in terms of quality issues and their cost.

(i) On Page 10 of the Plan, Council's ovals are graded in three levels – Regional, District, and Local.

Possible commercialisation of various codes and public ovals is unmentioned here. Keeping playing costs down is a major consideration with local sport, particularly for young people. However the conscious retention of public ownership of crown land resources is essential.

Gardens Oval No. 1 is designated as a Regional Oval of Council-to be their only one in Darwin.

Council's description for a Regional Oval is as follows:

'Regional facilities will be built and maintained to a premier standard based on the needs of specific sports/activities.

Regional facilities cater for training and competition for teams in elite level competitions and may have the capacity to host Territory or National standard fixtures.

Regional facilities are designed to service people from within the City of Darwin and beyond due to their level of specialisation, uniqueness or standard of competition being played.

Gated Venues to allow ticketing

Turf maintenance to accommodate elite competition levels of use.'

These points are the very opposite of the principles for local social benefits outlined in the Executive Summary of Council's Sports Field Plan, 2016-2026.

Elsewhere the plan promotes multi-use ovals. With its small population compared with other capital cities, Greater Darwin cannot afford to provide and maintain

more than one Regional Level Oval of this description.

(j) Gardens Oval No.1 is an old oval, part of the Mindil Beach Precinct, planned originally by Goyder's surveyors, forever for public general recreation of the community. It sits, alongside the George Brown Botanic Gardens, next to the Mindil foreshore, within a natural amphitheatre framed by the escarpment running from Myilly Point to Bullocky Point. This is a busy area for all sorts of personal fresh air recreation.

Gardens Oval is traditional public oval, with an historically unique natural family atmosphere. It is a relatively small multi-purpose oval which cannot possibly meet the standard of Council's new classification system as a Regional Oval.

This is not the place for Darwin's one Regional Oval facility. Large event crowd activities such as the Mindil Beach markets, Darwin Amphitheatre Concerts, happening at one time, particularly in the evenings, would cause transport and parking chao, even with the new arrangements being made at the Botanic Gardens. The area just does not have enough capacity to stretch further. There is vehicle and pedestrian/accident risk.

Costs of an attempted upgrade would be prohibitive.

4. Conclusion

The physical location of Gardens Oval, No. 1, quite close to the CBD, does not qualify it as a centre for elite sport, or for major event status. No preliminary steps should be taken

for the proposed costly night lighting, as suggested by Council.

Some may hope that running night lights for training would be the first step to Garden's Oval becoming Darwin's Regional Oval. This would be irresponsible considering the costs which would ultimately be an impost on ratepayers.

Any plan to redevelop the old Gardens Oval, No.1 to the standard of Council's Regional Oval status be with a view to catering for rare major events, mostly from invited visitors should not be contemplated, The oval should be used for local games and events.

If we are ever to have a Regional Level standard oval, with all its facilities and associated staff, it should be at Marrara.

Building on facilities and services at Marrara, is a far better solution, particularly as that precinct is much more central for players of sport than the CBD. Major events are best provided for by piggybacking on the Marrara existing government investment, rather than burdening ratepayers at every stage of redevelopment of Gardens Oval, No1.

No night lights at Garden Oval, No.1.

M A CLINCH
Convener
PLan: the Planning Action Network, Inc.

Submission 23

16th August 2017

Email from resident.
No content – just attachments.

Copies of attached provided.

Objection Gardens Oval 1 proposal of 4 Light Towers

a) Gardens Oval 1 Security lights currently operating on the oval each night.

Objection Gardens Oval 1 proposal of 4 Light Towers

b) View of the Light Tower erected on the Golf links Golf course 2013 (The rest of the approx 27 light towers was not approved by council). It is not pleasant when the light is operating to have the effect of the light spill invading our apartment 9/3 Warrego Court Larrakeyah.

Objection Gardens Oval 1 proposal of 4 Light Towers

d) View Asbuild Oval Light Tower from Packard Rd near round about Palmerston August 2017.

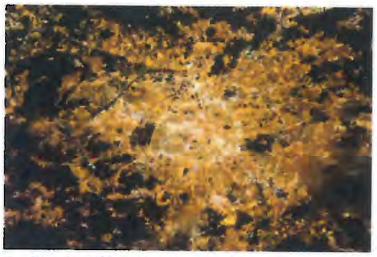
Objection Gardens Oval 1 proposal of 4 Light Towers

d i) 2nd View of Light Towers Asbuild Oval from Roystonea Rd (high way looking at lights) August 2017.

Light pollution

From Wikipedia, the free encyclopedia

Light pollution, also known as **photopollution**, is the presence of anthropogenic light in the night environment. It is exacerbated by excessive, misdirected or obtrusive uses of light, but even carefully used light fundamentally alters natural conditions. As a major side-effect of urbanization, it is blamed for compromising health, disrupting ecosystems and spoiling aesthetic environments.



Satellite view of Paris at night (France)

This time exposure photo of New York City at night shows skyglow, one form of light pollution.

A comparison of the view of the night sky from a small rural town (top) and a metropolitan area (bottom). Light pollution dramatically reduces the visibility of stars.

This nighttime look at our home planet dubbed the Black Marble, provides researchers with a unique perspective of human activities around the globe.

Contents

Definitions

Light pollution is the adding-of/added light itself, in analogy to added sound, carbon dioxide, etc. Adverse consequences are multiple; some of them may not be known yet. Scientific definitions thus include the following:

- The degradation of photic habitat by artificial light.[1]
- The alteration of natural light levels in the outdoor environment owing to artificial light sources.[2]
- The alteration of light levels in the outdoor environment (from those present naturally) due to man-made sources of light. Indoor light pollution is such alteration of light levels in the indoor environment due to sources of light, which compromises human health.[3]
- The introduction by humans, directly or indirectly, of artificial light into the environment.[4]

The first three of the above four scientific definitions describe the state of the environment. The fourth (and newest) one describes the process of polluting by light.

Light pollution competes with starlight in the night sky for urban residents, interferes with astronomical observatories,[5] and, like any other form of pollution, disrupts ecosystems and has adverse health effects.

Light pollution is a side effect of industrial civilization. Its sources include building exterior and interior lighting, advertising, outdoor area lighting (e.g. car parks/parking lots), offices, factories, streetlights, and illuminated sporting venues. It is most severe in highly industrialized, densely populated areas of North America, Europe, and Japan and in major cities in the Middle East and North Africa like Tehran and Cairo, but even relatively small amounts of light can be noticed and create problems. Awareness of the deleterious effects of light pollution began early in the 20th Century (see e.g. Beston [6]), but efforts to address effects did not begin until the 1950s.[7] In the 1980s a global dark-sky movement emerged with the founding of the International Dark-sky Association (IDA). There are now such educational and advocacy organizations in many countries worldwide.

Impact on energy usage

Energy conservation advocates contend that light pollution must be addressed by changing the habits of society, so that lighting is used more efficiently, with less waste and less creation of unwanted or unneeded illumination. Several industry groups also recognize light pollution as an important issue. For example, the Institution of Lighting Engineers in the United Kingdom provides its members with information about light pollution, the problems it causes, and how to reduce its impact.[8]

Since not everyone is irritated by the same lighting sources, it is common for one person's light "pollution" to be light that is desirable for another. One example of this is found in advertising, when an advertiser wishes for particular lights to be bright and visible, even though others find them annoying. Other types of light pollution are more certain. For instance, light that *accidentally* crosses a property boundary and annoys a neighbor is generally wasted and pollutive light.

Disputes are still common when deciding appropriate action, and differences in opinion over what light is considered reasonable, and who should be responsible, mean that negotiation must sometimes take place between parties. Where objective measurement is desired, light levels can be quantified by field measurement or mathematical modeling, with results typically displayed as an isophote map or light contour map. Authorities have also taken a variety of measures for dealing with light pollution, depending on the interests, beliefs and understandings of the society involved. Measures range from doing nothing at all, to implementing strict laws and regulations about how lights may be installed and used.

Types

Light pollution is a broad term that refers to multiple problems, all of which are caused by inefficient, unappealing, or (arguably) unnecessary use of artificial light. Specific categories of light pollution include light trespass, over-illumination, glare, light clutter, and skyglow. A single offending light source often falls into more than one of these categories.

An example of a light pollution source, using a broad spectrum metal halide lamp pointing upward at Unigema factory, Gouda, the Netherlands.

Light trespass

Light trespass occurs when unwanted light enters one's property, for instance, by shining over a neighbor's fence. A common light trespass problem occurs when a strong light enters the window of one's home from the outside, causing problems such as sleep deprivation. A number of cities in the U.S. have developed standards for outdoor lighting to protect the rights of their citizens against light trespass. To assist them, the International Dark-Sky Association has developed a set of model lighting ordinances.[9]

The Dark-Sky Association was started to reduce the light going up into the sky which reduces visibility of stars (see Skyglow below). This is any light which is emitted more than 90° above nadir. By limiting light at this 90° mark they have also reduced the light output in the 80–90° range which creates most of the light trespass issues.

U.S. federal agencies may also enforce standards and process complaints within their areas of jurisdiction. For instance, in the case of light trespass by white strobe lighting from communication towers in excess of FAA minimum lighting requirements[10] the Federal Communications Commission maintains an Antenna Structure Registration database[11] information which citizens may use to identify offending structures and provides a mechanism for processing citizen inquiries and complaints.[12] The U.S. Green Building Council (USGBC) has also incorporated a credit for reducing the amount of light trespass and sky glow into their environmentally friendly building standard known as LEED.

Light trespass can be reduced by selecting light fixtures which limit the amount of light emitted more than 80° above the nadir. The IESNA definitions include full cutoff (0%), cutoff (10%), and semi-cutoff (20%). (These definitions also include limits on light emitted above 90° to reduce sky glow.)

Over-illumination

Over-illumination is the excessive use of light. Specifically within the United States, over-illumination is responsible for approximately two million barrels of oil per day in energy wasted. This is based upon U.S. consumption of equivalent of 18.8 million barrels per day (2,990,000 m^3/d) of petroleum.[13] It is further noted in the same U.S. Department of Energy source that over 30% of all primary energy is consumed by commercial, industrial and residential sectors. Energy audits of existing buildings demonstrate that the lighting component of residential, commercial and industrial uses consumes about 20–40% of those land uses, variable with region and land use. (Residential use lighting consumes only 10–30% of the energy bill while commercial buildings' major use is lighting.[14]) Thus lighting energy accounts for about four or five million barrels of oil (equivalent) per day. Again energy audit data demonstrates that about 30–60% of energy consumed in lighting is unneeded or gratuitous.[15]

An office building is illuminated by high pressure sodium (HPS) lamps shining upward, of which much light goes into the sky and neighboring apartment blocks and causes light pollution.

An alternative calculation starts with the fact that commercial building lighting consumes in excess of 81.68 terawatts (1999 data) of electricity,[16] according to the U.S. DOE. Thus commercial lighting alone consumes about four to five million barrels per day (equivalent) of petroleum, in line with the alternate rationale above to estimate U.S. lighting energy consumption. Even among developed countries there are large differences in patterns of light use. American cities emit 3–5 times more light to space per capita compared to German cities.[17]

Over-illumination stems from several factors:

- Not using timers, occupancy sensors or other controls to extinguish lighting when not needed;
- Improper design, especially of workplace spaces, by specifying higher levels of light than needed for a given task;
- Incorrect choice of fixtures or light bulbs, which do not direct light into areas as needed;
- Improper selection of hardware to utilize more energy than needed to accomplish the lighting task;
- Incomplete training of building managers and occupants to use lighting systems efficiently;
- Inadequate lighting maintenance resulting in increased stray light and energy costs;
- "Daylight lighting" demanded by citizens to reduce crime or by shop owners to attract customers;[18]
- Substitution of old mercury lamps with more efficient sodium or metal halide lamps using the same electrical power; and
- Indirect lighting techniques, such as illuminating a vertical wall to bounce light onto the ground.

Most of these issues can be readily corrected with available, inexpensive technology, and with resolution of landlord/tenant practices that create barriers to rapid correction of these matters. Most importantly, public awareness would need to improve for industrialized countries to realize the large payoff in reducing over-illumination.

In certain cases an over-illumination lighting technique may be needed. For example, indirect lighting is often used to obtain a "softer" look, since hard direct lighting is generally found less desirable for certain surfaces, such as skin. The indirect lighting method is perceived as more cozy and suits bars, restaurants and living quarters. It is also possible to block the direct lighting effect by adding softening filters or other solutions, though intensity will be reduced.

Glare

Glare can be categorized into different types. One such classification is described in a book by Bob Mizon, coordinator for the British Astronomical Association's Campaign for Dark Skies, as follows:[19]

- *Blinding glare* describes effects such as that caused by staring into the Sun. It is completely blinding and leaves temporary or permanent vision deficiencies.
- *Disability glare* describes effects such as being blinded by oncoming car lights, or light scattering in fog or in the eye, reducing contrast, as well as reflections from print and other dark areas that render them bright, with significant reduction in sight capabilities.
- *Discomfort glare* does not typically cause a dangerous situation in itself, though it is annoying and irritating at best. It can potentially cause fatigue if experienced over extended periods.

According to Mario Motta, president of the Massachusetts Medical Society, "... glare from bad lighting is a public-health hazard—especially the older you become. Glare light scattering in the eye causes loss of contrast and leads to unsafe driving conditions, much like the glare on a dirty windshield from low-angle sunlight or the high beams from an oncoming car."[20] In essence bright and/or badly shielded lights around roads can partially blind drivers or pedestrians and contribute to accidents.

The blinding effect is caused in large part by reduced contrast due to light scattering in the eye by excessive brightness, or to reflection of light from dark areas in the field of vision, with luminance similar to the background luminance. This kind of glare is a particular instance of disability glare, called veiling glare. (This is not the same as loss of accommodation of night vision which is caused by the direct effect of the light itself on the eye.)

Light clutter

Light clutter refers to excessive groupings of lights. Groupings of lights may generate confusion, distract from obstacles (including those that they may be intended to illuminate), and potentially cause accidents. Clutter is particularly noticeable on roads where the street lights are badly designed, or where brightly lit advertising surrounds the roadways. Depending on the motives of the person or organization that installed the lights, their placement and design can even be intended to distract drivers, and can contribute to accidents.

The Las Vegas Strip displays excessive groupings of colorful lights. This is a classic example of light clutter.

Clutter may also present a hazard in the aviation environment if aviation safety lighting must compete for pilot attention with non-relevant lighting.[21] For instance, runway lighting may be confused with an array of suburban commercial lighting and aircraft collision avoidance lights may be confused with ground lights.

Skyglow

Skyglow refers to the diffuse glow that can be seen over populated areas. It arises from light reflected from illuminated surfaces and from light escaping directly upward from incompletely shielded or upward-directed light fixtures, which then is scattered (redirected) by the atmosphere back toward the ground. The brightness of skyglow is affected strongly by the amount of light used, the shielding characteristics of the light fixtures, and by the color or spectral content of the light sources. Though it is commonly thought that Rayleigh scattering strongly increases the brightness of skyglow arising from white sources with strong blue and green emission, the dominant spectral effect has been shown to arise from the Purkinje effect instead.[22][23][24] Because of the eye's increased sensitivity to blue and green light when adapted to very low luminance levels (such as those in even moderately polluted clear night skies), white light sources such as white LEDs contribute significantly more to skyglow than an equal amount of yellow light from sources such as high-pressure sodium, low-pressure sodium, "phosphor-converted" (PC) amber LED, or "narrow spectrum" amber AlGaInP LEDs. Sky glow is of particular irritation to astronomers, as it interferes with astronomical observations, but multitudes suffer from the decreased visibility of star-filled night skies.

Mexico City at night, with a brightly illuminated sky

Skyglow brightness can be measured with instruments such as the Sky Quality Meters (SQM), or visually using the Bortle Dark-Sky Scale.[25][26] The nine-class Bortle Scale rates the darkness of the night sky and the visibility of its phenomena, such as the Milky Way, gegenschein and the zodiacal light (easily masked by skyglow), providing a detailed description of each level on the scale (with Class 1 being the best).

In pristine areas, clouds appear black and blot out the stars. In urban areas, clouds strongly enhance skyglow.

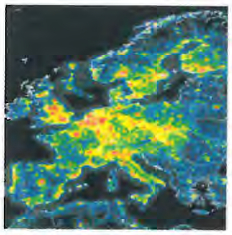
Light is particularly problematic for amateur astronomers, whose ability to observe the night sky from their property is inhibited by any stray light from nearby. Most major optical astronomical observatories are surrounded by zones of strictly enforced restrictions on light emissions to limit skyglow.

Direct skyglow is reduced by selecting lighting fixtures which limit the amount of light emitted above the horizontal (90° above the nadir). Indirect skyglow produced by reflections from illuminated surfaces is harder to manage; effective methods for limiting it include the use of low-impact lamp types (e.g. amber sources, see above), minimizing over-illumination and inefficient designs or fixtures that spread light where it is not needed. But it has to be taken into account that, according to late 2010 publications, Italian regions using full cut off lighting only does not increase skyglow.[27] Anyway, light reflected upwards by dark surfaces such as roads or buildings can be considered as minor, so debate about the contribution of indirect skyglow will continue.

Skyglow is made considerably worse when clouds are present.[28] While this has no effect on astronomical observations (which are not possible at visible wavelengths under cloud cover), it is very important in the context of ecological light pollution. Since cloudy nights in artificially lit areas can be up to ten thousand times brighter than in natural areas,[29] any organisms that are affected by sky glow (e.g. zooplankton and fish that visually prey on them) are much more likely to have their ordinary behavior disturbed on cloudy nights.

Impacts of skyglow are explored in the photography and timelapse project SKYGLOW, created in collaboration with International Dark-Sky Association.

Measurement and global effects



False colors show intensities of skyglow from artificial light sources.

Measuring the effect of sky glow on a global scale is a complex procedure. The natural atmosphere is not completely dark, even in the absence of terrestrial sources of light and illumination from the Moon. This is caused by two main sources: *airglow* and *scattered light*.

At high altitudes, primarily above the mesosphere, there is enough UV radiation from the sun of very short wavelength to cause ionization. When the ions collide with electrically neutral particles they recombine and emit photons in the process, causing airglow. The degree of ionization is sufficiently large to allow a constant emission of radiation even during the night when the upper atmosphere is in the Earth's shadow. Lower in the atmosphere all of the solar photons with energies above the ionization potential of N_2 and O_2 have already been absorbed by the higher layers and thus no appreciable ionization occurs.

Apart from emitting light, the sky also scatters incoming light, primarily from distant stars and the Milky Way, but also the zodiacal light, sunlight that is reflected and backscattered from interplanetary dust particles.

The amount of airglow and zodiacal light is quite variable (depending, amongst other things on sunspot activity and the Solar cycle) but given optimal conditions the darkest possible sky has a brightness of about 22 magnitude/square arcsecond. If a full moon is present, the sky brightness increases to about 18 magnitude/sq. arcsecond depending on local atmospheric transparency, 40 times brighter than the darkest sky. In densely populated areas a sky brightness of 17 magnitude/sq. arcsecond is not uncommon, or as much as 100 times brighter than is natural.

To precisely measure how bright the sky gets, night time satellite imagery of the earth is used as raw input for the number and intensity of light sources. These are put into a physical model[30] of scattering due to air molecules and aerosoles to calculate cumulative sky brightness. Maps that show the enhanced sky brightness have been prepared for the entire world.[31]

Inspection of the area surrounding Madrid reveals that the effects of light pollution caused by a single large conglomeration can be felt up to 100 km (62 mi) away from the center.[32] Global effects of light pollution are also made obvious. The entire area consisting of southern England, Netherlands, Belgium, west Germany, and northern France have a sky brightness of at least 2 to 4 times above normal (see above right). The only places in continental Europe where the sky can attain its natural darkness are in northern Scandinavia and in islands far from the continent.

In North America the situation is comparable. There is a significant problem with light pollution ranging from the Canadian Maritime Provinces to the American Southwest.[32] The International Dark-Sky Association works to designate areas that have high quality night skies. These areas are supported by communities and organizations that are dedicated to reducing light pollution (e.g.Dark-sky preserve). The National Park Service Natural Sounds and Night Skies Division has measured

night sky quality in national park units across the U.S. Sky quality in the U.S. ranges from pristine (Capitol Reef National Park and Big Bend National Park) to severely degraded (Santa Monica Mountains National Recreation Area and Biscayne National Park).[33] The National Park Service Night Sky Program monitoring database is available online (2015).[34]

Light pollution in Hong Kong was declared the 'worst on the planet' in March 2013.[35]

In June 2016, it was estimated that one third of the world's population could no longer see the Milky Way, including 80% of Americans and 60% of Europeans. Singapore was found to be the most light-polluted country in the world.[36][32]

A worldwide cloud-free mosaic from the Suomi NPP satellite, showing the extent of visible lights in 2016. The effects of light pollution – especially skyglow – spread far beyond the light sources visible here.

Consequences

Energy waste

Lighting is responsible for one-fourth of all electricity consumption worldwide, and case studies have shown that several forms of over-illumination constitute energy wastage, including non-beneficial upward direction of night-time lighting. In 2007, Terna, the company responsible for managing electricity flow in Italy, reported a saving of 645.2 million kWh in electricity consumption during the daylight saving period from April to October. It attributes this saving to the delayed need for artificial lighting during the evenings.

Christmas lights in California

In Australia,

> ... public lighting is the single largest source of local government's greenhouse gas emissions, typically accounting for 30 to 50% of their emissions. There are 1.94 million public lights — one for every 10 Australians — that annually cost A$210 million, use 1,035 GWh of electricity and are responsible for 1.15 million tonnes of CO2 emissions.
>
> Current public lighting in Australia, particularly for minor roads and streets, uses large amounts of energy and financial resources, while often failing to provide high quality lighting. There are many ways to improve lighting quality while reducing energy use and greenhouse gas emissions as well as lowering costs.[37]

Effects on animal and human health and psychology

Medical research on the effects of excessive light on the human body suggests that a variety of adverse health effects may be caused by light pollution or excessive light exposure, and some lighting design textbooks[38] use human health as an explicit criterion for proper interior lighting. Health effects of over-illumination or improper spectral composition of light may include: increased headache incidence, worker fatigue, medically defined stress, decrease in sexual function and increase in anxiety.[39][40][41][42] Likewise, animal models have been studied demonstrating unavoidable light to produce adverse effect on mood and anxiety.[43] For those who need to be awake at night, light at night also has an acute effect on alertness and mood.[44]

Streetlights in the skiing resort Kastelruth in South Tyrol

In 2007, "shift work that involves circadian disruption" was listed as a probable carcinogen by the World Health Organization's International Agency for Research on Cancer. (IARC Press release No. 180).[45][46] Multiple studies have documented a correlation between night shift work and the increased incidence of breast and prostate cancer.[47][48][49][50][51][52]

A more recent discussion (2009), written by Professor Steven Lockley, Harvard Medical School, can be found in the CfDS handbook "Blinded by the Light?".[53] Chapter 4, "Human health implications of light pollution" states that "... light intrusion, even if dim, is likely to have measurable effects on sleep disruption and melatonin suppression. Even if these effects are relatively small from night to night, continuous chronic circadian, sleep and hormonal disruption may have longer-term health risks". The New York Academy of Sciences hosted a meeting in 2009 on Circadian Disruption and Cancer.[54] Red light suppresses melatonin the least.[55]

In June 2009, the American Medical Association developed a policy in support of control of light pollution. News about the decision emphasized glare as a public health hazard leading to unsafe driving conditions. Especially in the elderly, glare produces loss of contrast, obscuring night vision.[20]

Disruption of ecosystems

When artificial light affects organisms and ecosystems.it is called ecological light pollution. While light at night can be beneficial, neutral, or damaging for individual species, its presence invariably disturbs ecosystems. For example, some species of spiders avoid lit areas, while other species are happy to build their spider web directly on a lamp post. Since lamp posts attract many flying insects, the spiders that don't mind light gain an advantage over the spiders that avoid it. This is a simple example of the way in which species frequencies and food webs can be disturbed by the introduction of light at night.

Light pollution poses a serious threat in particular to nocturnal wildlife, having negative impacts on plant and animal physiology. It can confuse animal navigation, alter competitive interactions, change predator-prey relations, and cause physiological harm.[56] The rhythm of life is orchestrated by the natural diurnal patterns of light and dark, so disruption to these patterns impacts the ecological dynamics.[57]

Studies suggest that light pollution around lakes prevents zooplankton, such as Daphnia, from eating surface algae, causing algal blooms that can kill off the lakes' plants and lower water quality.[58] Light pollution may also affect ecosystems in other ways. For example, lepidopterists and entomologists have documented that nighttime light may interfere with the ability of moths and other nocturnal insects to navigate.[59] Night-blooming flowers that depend on moths for pollination may be affected by night lighting, as there is no replacement pollinator that would not be affected by the artificial light. This can lead to species decline of plants that are unable to reproduce, and change an area's longterm ecology.

A 2009 study[60] also suggests deleterious impacts on animals and ecosystems because of perturbation of polarized light or artificial polarization of light (even during the day, because direction of natural polarization of sun light and its reflexion is a source of information for a lot of animals). This form of pollution is named polarized light pollution (PLP). Unnatural polarized light sources can trigger maladaptive behaviors in polarization-sensitive taxa and alter ecological interactions.[60]

Lights on tall structures can disorient migrating birds. Estimates by the U.S. Fish and Wildlife Service of the number of birds killed after being attracted to tall towers range from 4 to 5 million per year to an order of magnitude higher.[61] The Fatal Light Awareness Program (FLAP) works with building owners in Toronto, Canada and other cities to reduce mortality of birds by turning out lights during migration periods.

Similar disorientation has also been noted for bird species migrating close to offshore production and drilling facilities. Studies carried out by Nederlandse Aardolie Maatschappij b.v. (NAM) and Shell have led to development and trial of new lighting technologies in the North Sea. In early 2007, the lights were installed on the Shell production platform L15. The experiment proved a great success since the number of birds circling the platform declined by 50 to 90%.[62]

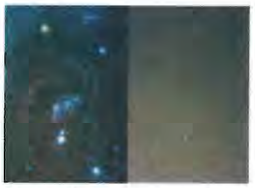
Sea turtle hatchlings emerging from nests on beaches are another casualty of light pollution. It is a common misconception that hatchling sea turtles are attracted to the moon. Rather, they find the ocean by moving away from the dark silhouette of dunes and their vegetation, a behavior with which artificial lights interfere.[63] The breeding activity and reproductive phenology of toads, however, are cued by moonlight.[64] Juvenile seabirds may also be disoriented by lights as they leave their nests and fly out to sea.[65][66][67] Amphibians and reptiles are also affected by light pollution. Introduced light sources during normally dark periods can disrupt levels of melatonin production. Melatonin is a hormone that regulates photoperiodic physiology and behaviour. Some species of frogs and salamanders utilize a light-dependent "compass" to orient their migratory behaviour to breeding sites. Introduced light can also cause developmental irregularities, such as retinal damage, reduced sperm production, and genetic mutation.[56][68][69][70][71][72]

In September 2009, the 9th European Dark-Sky Symposium in Armagh, Northern Ireland had a session on the environmental effects of light at night (LAN). It dealt with bats, turtles, the "hidden" harms of LAN, and many other topics.[73] The environmental effects of LAN were mentioned as early as 1897, in a *Los Angeles Times* article. The following is an excerpt from that article, called "Electricity and English songbirds":

> An English journal has become alarmed at the relation of electricity to songbirds, which it maintains is closer than that of cats and fodder crops. How many of us, it asks, foresee that electricity may extirpate the songbird?...With the exception of the finches, all the English songbirds may be said to be insectivorous, and their diet consists chiefly of vast numbers of very small insects which they collect from the grass and herbs before the dew is dry. As the electric light is finding its way for street illumination into the country parts of England, these poor winged atoms are slain by thousands at each light every warm summer evening....The fear is expressed, that when England is lighted from one end to the other with electricity the song birds will die out from the failure of their food supply.[74]

Effect on astronomy

Astronomy is very sensitive to light pollution. The night sky viewed from a city bears no resemblance to what can be seen from dark skies.[75] Skyglow (the scattering of light in the atmosphere) reduces the contrast between stars and galaxies and the sky itself, making it much harder to see fainter objects. This is one factor that has caused newer telescopes to be built in increasingly remote areas. Some astronomers use narrow-band "nebula filters" which only allow specific wavelengths of light commonly seen in nebulae, or broad-band "light pollution filters" which are designed to reduce (but not eliminate) the effects of light pollution by filtering out spectral lines commonly emitted by sodium- and mercury-vapor lamps, thus enhancing contrast and improving the view of dim objects such as galaxies and nebulae.[76] Unfortunately these light pollution reduction (LPR) filters are not a cure for light pollution. LPR filters reduce the brightness of the object under study and this limits the use of higher magnifications. LPR filters work by blocking light of certain wavelengths, which alters the color of the object, often creating a pronounced green cast. Furthermore, LPR filters only work on certain object types (mainly emission nebulae) and are of little use on galaxies and stars. No filter can match the effectiveness of a dark sky for visual or photographic purposes. Due to their low surface brightness, the visibility of diffuse sky objects such as nebulae and galaxies is affected by light pollution more than are stars. Most such objects are rendered invisible in heavily light polluted skies around major cities. A simple method for estimating the darkness of a location is to look for the Milky Way, which from truly dark skies appears bright enough to cast a shadow.[77]



The constellation Orion, imaged at left from dark skies, and at right from within the Provo-Orem, Utah metropolitan area

Outdoors of the Atacama Desert, far from the light-polluted cities of northern Chile, the skies are pitch-black after sunset.[78]

In addition to skyglow, light trespass can impact observations when artificial light directly enters the tube of the telescope and is reflected from non-optical surfaces until it eventually reaches the eyepiece. This direct form of light pollution causes a glow across the field of view which reduces contrast. Light trespass also makes it hard for a visual observer to become sufficiently dark adapted. The usual measures to reduce this glare, if reducing the light directly is not an option, include flocking the telescope tube and accessories to reduce reflection, and putting a light shield (also usable as a dew shield) on the telescope to reduce light entering from angles other than those near the target. Under these conditions, some astronomers prefer to observe under a black cloth to ensure maximum dark adaptation. In one Italian regional lighting code this effect of stray light is defined as "optical pollution", due to the fact that there is a direct path from the light source to the "optic" – the observer's eye or telescope.

Increase in atmospheric pollution

A study presented at the American Geophysical Union meeting in San Francisco found that light pollution destroys nitrate radicals thus preventing the normal night time reduction of atmospheric smog produced by fumes emitted from cars and factories.[79][80] The study was presented by Harald Stark from the National Oceanic and Atmospheric Administration.

Reduction of natural sky polarization

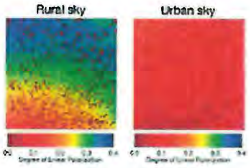
In the night, the polarization of the moonlit sky is very strongly reduced in the presence of urban light pollution, because scattered urban light is not strongly polarized.[81] Polarized moonlight can't be seen by humans, but is believed to be used by many animals for navigation.

Reduction

Reducing light pollution implies many things, such as reducing sky glow, reducing glare, reducing light trespass, and reducing clutter. The method for best reducing

light pollution, therefore, depends on exactly what the problem is in any given instance. Possible solutions include:

- Utilizing light sources of minimum intensity necessary to accomplish the light's purpose.
- Turning lights off using a timer or occupancy sensor or manually when not needed.
- Improving lighting fixtures, so that they direct their light more accurately towards where it is needed, and with fewer side effects.
- Adjusting the *type* of lights used, so that the light waves emitted are those that are less likely to cause severe light pollution problems. Mercury, metal halide and above all first generation of blue-light LED road luminaires are much more pollutant than sodium lamps: Earth atmosphere scatters and transmits blue light better than yellow or red light. It is a common experience observing "glare" and "fog" around and below LED road luminaires as soon as air humidity increases, while orange sodium lamp luminaires are less prone to show this phenomenon.
- Evaluating existing lighting plans, and re-designing some or all of the plans depending on whether existing light is actually needed.



Light pollution is mostly unpolarized, and its addition to moonlight results in a decreased polarization signal.

Improving lighting fixtures

The use of *full cutoff* lighting fixtures, as much as possible, is advocated by most campaigners for the reduction of light pollution. It is also commonly recommended that lights be spaced appropriately for maximum efficiency, and that number of luminaires being used as well as the wattage of each luminaire match the needs of the particular application (based on local lighting design standards).

Full cutoff fixtures first became available in 1959 with the introduction of General Electric's M100 fixture.[82]

A full cutoff fixture, when correctly installed, reduces the chance for light to escape above the plane of the horizontal. Light released above the horizontal may sometimes be lighting an intended target, but often serves no purpose. When it enters into the atmosphere, light contributes to sky glow. Some governments and organizations are now considering, or have already implemented, full cutoff fixtures in street lamps and stadium lighting.


This kind of LED downlight could reduce unnecessary light pollution in building interiors.

The use of full cutoff fixtures help to reduce sky glow by preventing light from escaping above the horizontal. Full cutoff typically reduces the visibility of the lamp and reflector within a luminaire, so the effects of glare are also reduced. Campaigners also commonly argue that full cutoff fixtures are more efficient than other fixtures, since light that would otherwise have escaped into the atmosphere may instead be directed towards the ground. However, full cutoff fixtures may also trap more light in the fixture than other types of luminaires, corresponding to lower luminaire efficiency, suggesting a re-design of some luminaires may be necessary.

The use of full cutoff fixtures can allow for lower wattage lamps to be used in the fixtures, producing the same or sometimes a better effect, due to being more carefully controlled. In every lighting system, some sky glow also results from light reflected from the ground. This reflection can be reduced, however, by being careful to use only the lowest wattage necessary for the lamp, and setting spacing between lights appropriately.[83] Assuring luminaire setback is greater than 90° from highly reflective surfaces also diminishes reflectance.


A *flat-lens cobra luminaire*, which is a full-cutoff fixture, is very effective in reducing light pollution. It ensures that light is only directed below the horizontal, which means less light is wasted through directing it outwards and upwards.

A common criticism of full cutoff lighting fixtures is that they are sometimes not as aesthetically pleasing to look at. This is most likely because historically there has not been a large market specifically for full cutoff fixtures, and because people typically like to see the source of illumination. Due to the specificity with their direction of light, full cutoff fixtures sometimes also require expertise to install for maximum effect.

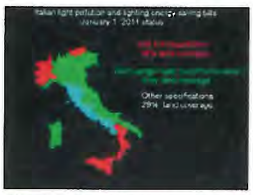
The effectiveness of using full cutoff roadway lights to combat light pollution has also been called into question. According to design investigations, luminaires with full cutoff distributions (as opposed to *cutoff* or *semi cutoff*, compared here[84]) have to be closer together to meet the same light level, uniformity and glare requirements specified by the IESNA. These simulations optimized the height and spacing of the lights while constraining the overall design to meet the IESNA requirements, and then compared total uplight and energy consumption of different luminaire designs and powers. Cutoff designs performed better than full cutoff designs, and semi-cutoff performed better than either cutoff or full cutoff. This indicates that, in roadway installations, over-illumination or poor uniformity produced by full cutoff fixtures may be more detrimental than direct uplight created by fewer cutoff or semi-cutoff fixtures. Therefore, the overall performance of existing systems could be improved more by reducing the number of luminaires than by switching to full cutoff designs.


This *drop-lens cobra luminaire* allows light to escape sideways and upwards, where it may cause problems.

However, using the definition of "light pollution" from some Italian regional bills (i.e., "every irradiance of artificial light outside competence areas and particularly upward the sky") only full cutoff design prevents light pollution. The Italian Lombardy region, where only full cutoff design is allowed (Lombardy act no. 17/2000, promoted by Cielobuio-coordination for the protection of the night sky), in 2007 had the lowest per capita energy consumption for public lighting in Italy. The same legislation also imposes a minimum distance between street lamps of about four times their height, so full cut off street lamps are the best solution to reduce both light pollution and electrical power usage.

Adjusting types of light sources

Several different types of light sources exist, each having different properties that affect their appropriateness for certain tasks, particularly efficiency and spectral power distribution. It is often the case that inappropriate light sources have been selected for a task, either due to ignorance or because more sophisticated light sources were unavailable at the time of installation. Therefore, badly chosen light sources often contribute unnecessarily to light pollution and energy waste. By re-assessing and changing the light sources used, it is often possible to reduce energy use and pollutive effects while simultaneously greatly improving efficiency and visibility.


The majority of Italian regions require "zero upward light", which usually implies use of overall full cut-off lamps for new luminaires, but violations are common.

Some types of light sources are listed in order of energy efficiency in the table below (figures are approximate maintained values), and include relative visual skyglow impacts.[22][23]

Type of light source	Color	Luminous efficiency (in lumens per watt)	Sky glow impact (relative to LPS)
LED street light (white)	warm-white to cool-white	120	4–8
Low Pressure Sodium (LPS/SOX)	yellow/amber	110	1.0
High Pressure Sodium (HPS/SON)	pink/amber-white	90	2.4
Metal Halide	warm-white to cool-white	70	4–8
Incandescent	yellow/white	8–25	1.1

Many astronomers request that nearby communities use low pressure sodium lights or amber Aluminium gallium indium phosphide LED as much as possible, because the principal wavelength emitted is comparably easy to work around or in rare cases filter out.[85] The low cost of operating sodium lights is another feature. In 1980, for example, San Jose, California, replaced all street lamps with low pressure sodium lamps, whose light is easier for nearby Lick Observatory to filter out. Similar programs are now in place in Arizona and Hawaii. Such yellow light sources also have significantly less visual skyglow impact,[24] so reduce visual sky brightness and improve star visibility for everyone.

Disadvantages of low pressure sodium lighting are that fixtures must usually be larger than competing fixtures, and that color cannot be distinguished, due to its emitting principally a single wavelength of light (see security lighting). Due to the substantial size of the lamp, particularly in higher wattages such as 135 W and 180 W, control of light emissions from low pressure sodium luminaires is more difficult. For applications requiring more precise direction of light (such as narrow roadways) the native lamp efficacy advantage of this lamp type is decreased and may be entirely lost compared to high pressure sodium lamps. Allegations that this also leads to higher amounts of light pollution from luminaires running these lamps arise principally because of older luminaires with poor shielding, still widely in use in the UK and in some other locations. Modern low-pressure sodium fixtures with better optics and full shielding, and the decreased skyglow impacts of yellow light preserve the luminous efficacy advantage of low-pressure sodium and result in most cases is less energy consumption and less visible light pollution. Unfortunately, due to continued lack of accurate information,[86] many lighting professionals continue to disparage low-pressure sodium, contributing to its decreased acceptance and specification in lighting standards and therefore its use. Another disadvantage of low-pressure sodium lamps is that some people find the characteristic yellow light very displeasing aesthetically.

Because of the increased sensitivity of the human eye to blue and green wavelengths when viewing low-luminances (the Purkinje effect) in the night sky, different sources produce dramatically different amounts of visible skyglow from the same amount of light sent into the atmosphere.

Re-designing lighting plans

In some cases, evaluation of existing plans has determined that more efficient lighting plans are possible. For instance, light pollution can be reduced by turning off unneeded outdoor lights, and only lighting stadiums when there are people inside. Timers are especially valuable for this purpose. One of the world's first coordinated *legislative* efforts to reduce the adverse effect of this pollution on the environment began in Flagstaff, Arizona, in the U.S. There, over three decades of ordinance development has taken place, with the full support of the population,[87] often with government support,[88] with community advocates,[89] and with the help of major local observatories,[90] including the United States Naval Observatory Flagstaff Station. Each component helps to educate, protect and enforce the imperatives to intelligently reduce detrimental light pollution.

One example of a lighting plan assessment can be seen in a report originally commissioned by the Office of the Deputy Prime Minister in the United Kingdom, and now available through the Department for Communities and Local Government.[91] The report details a plan to be implemented throughout the UK, for designing lighting schemes in the countryside, with a particular focus on preserving the environment.

In another example, the city of Calgary has recently replaced most residential street lights with models that are comparably energy efficient.[92] The motivation is primarily operation cost and environmental conservation. The costs of installation are expected to be regained through energy savings within six to seven years.

The Swiss Agency for Energy Efficiency (SAFE) uses a concept that promises to be of great use in the diagnosis and design of road lighting, "*consommation électrique spécifique (CES)*", which can be translated into English as "specific electric power consumption (SEC)".[93] Thus, based on observed lighting levels in a wide range of Swiss towns, SAFE has defined target values for electric power consumption per metre for roads of various categories. Thus, SAFE currently recommends an SEC of 2 to 3 watts per meter for roads of less than 10 metre width (4 to 6 watts per metre for wider roads). Such a measure provides an easily applicable environmental protection constraint on conventional "norms", which usually are based on the recommendations of lighting manufacturing interests, who may not take into account environmental criteria. In view of ongoing progress in lighting technology, target SEC values will need to be periodically revised downwards.

A newer method for predicting and measuring various aspects of light pollution was described in the journal Lighting Research Technology (September 2008). Scientists at Rensselaer Polytechnic Institute's Lighting Research Center have developed a comprehensive method called Outdoor Site-Lighting Performance (OSP), which allows users to quantify, and thus optimize, the performance of existing and planned lighting designs and applications to minimize excessive or obtrusive light leaving the boundaries of a property. OSP can be used by lighting engineers immediately, particularly for the investigation of glow and trespass (glare analyses are more complex to perform and current commercial software does not readily allow them), and can help users compare several lighting design alternatives for the same site.[94]

Crossroad in Alessandria, Italy: luminaires with mercury lamps are in the background, LED street lights in the middle, luminaires with high pressure sodium lamps are in the foreground

In the effort to reduce light pollution, researchers have developed a "Unified System of Photometry," which is a way to measure how much or what kind of street lighting is needed. The Unified System of Photometry allows light fixtures to be designed to reduce energy use while maintaining or improving perceptions of visibility, safety, and security.[95] There was a need to create a new system of light measurement at night because the biological way in which the eye's rods and cones process light is different in nighttime conditions versus daytime conditions. Using this new system of photometry, results from recent studies have indicated that replacing traditional, yellowish, high-pressure sodium (HPS) lights with "cool" white light sources, such as induction, fluorescent, ceramic metal halide, or LEDs can actually reduce the amount of electric power used for lighting while maintaining or improving visibility in nighttime conditions.[96]

The International Commission on Illumination, also known as the CIE from its French title, la Commission Internationale de l'Eclairage, will soon be releasing its own form of unified photometry for outdoor lighting.

See also

- Bortle Dark-Sky Scale
- Campaign for Dark Skies (CfDS)
- Dark-sky preserve
- Earth Hour
- *The End of Night* (book)
- History of street lighting in the United States
- Light pollution in Hong Kong
- International Dark-Sky Association
- Lighting
- List of environmental health hazards
- National Dark-Sky Week
- Over-illumination
- Polarized light pollution
- Scotobiology
- *Tribute in Light*
- SKYGLOW

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External links

Related organizations

- International Dark-Sky Association (http://www.darksky.org/)
  - Austria: Verein Kuffner Sternwarte (http://kuffner-sternwarte.at/) (How many stars? (http://sternhell.at/))
- NPS Night Sky Team of Air Resources Division. "Explore Air: Natural Lightscapes" (http://www.nature.nps.gov/air/lightscapes/index.cfm). *Explore Nature*. National Park Service.
- Rensselaer Polytechnic Institute's Lighting Research Center (http://www.lrc.rpi.edu)
- Campaign for Dark Skies (http://www.britastro.org/dark-skies/) (UK)
- SELENE (http://selene-ny.org/) (New York)
- Virginia Outdoor Lighting Taskforce (http://www.volt.org)
- Spanish Cel Fosc (http://www.celfosc.org/indice.html)
- Fatal Light Awareness Program (FLAP) (http://www.flap.org) (Toronto)
- Starlight: a common heritage. (http://www.starlight2007.net/)
- Sydney Outdoor Lighting Improvement Society (http://www.solis.org.au)
- Illinois Coalition for Responsible Outdoor Lighting (http://www.illinoislighting.org) (U.S.A.)

Research

- Indexed list of peer reviewed light pollution research papers (http://userpage.fu-berlin.de/~kyba/literature.html)
- Need-Less (http://www.need-less.org.uk/) – Interactive simulations that demonstrate the effects of light pollution
- "Lighting and Astronomy: Light Pollution" (http://www.darkskiesawareness.org/files/PTarticle_Lighting&Astronomy.pdf)
- Article "What is Light Pollution" (http://www.savethenight.eu/What%20is.html)
- "The Disappearance of Darkness" History of Light Pollution (http://www.everythingintheuniverse.com/node/45)
- Loss of the Night Network (LONNE) (http://www.cost-lonne.eu/) – European Research Network COST Aktion ES1204
- *Verlust der Nacht – Loss of the Night* (http://www.verlustdernacht.de/about-us.html) – Interdisciplinary light pollution research project in Germany
- *Verlust der Nacht – Citizen science app* (https://play.google.com/store/apps/details?id=com.cosalux.welovestars) – Open source android application to measure light pollution
- Technical slide show "Lamp Spectrum and Light Pollution: The Other Side of Light Pollution" (http://www.cormusa.org/uploads/Lamp_Spectrum_and_Light_Pollution.pdf)
- MAG Dark Skies Outdoor Lighting Codes and Issues (http://www.mag.maricopa.gov/pdf/cms.resource/DSSG_2009-04-07_Outdoor-Lighting-Lighting-Codes35271.pdf)
- Mail Tribune Article "Seeing Stars: The fight against light pollution" (http://www.mailtribune.com/apps/pbcs.dll/article?AID=/20080208/LIFE/802080321)
- European Light pollution – technical articles (http://www.lightpollution.it/cinzano/en/index.html)
- U.S. National Parks technical article "Modeling Light Pollution from Population Data" (http://www.georgewright.org/184albers.pdf)
- Dark Skies Coalition (http://www.flagstaffdarkskies.org/)
- The Challenge article "Is Light Pollution Killing Our Birds" (http://www.lightpollution.org.uk/)
- "Ecological Consequences of Artificial Night Lighting" (http://www.urbanwildlands.org/conference.html) (2002 conference, by the Urban Wildlands Group)
- Light pollution and the protection of the night environment (http://www.inquinamentoluminoso.it/istil/venice/index.html), UNESCO, IDA Regional Meeting, 360 pages, (2002) English — Italian. Proceedings are available as a downloadable PDF.
- Sherbrooke College Light pollution research activities (http://cegepsherbrooke.qc.ca/~aubema/index.php/Prof/Recherches)
- Examples of the good, bad and ugly lighting (http://www.fraserf.id.au/astronomy/martin-lewicki/lpgallry.htm)
- "Blinded by the Light?", CfDS 2009, Various authors discussing the "hidden" environmental harm, the human health harm, the money waste, lighting failing to prevent crime, and even astronomy (http://www.britastro.org/dark-skies/pdfs/HANDBOOKTEXT.pdf)
- Outdoor Lighting: Visual Efficacy – Recommendations on how to design energy-efficient outdoor lighting while reducing light pollution. (http://www.lrc.rpi.edu/programs/solidstate/assist/pdf/AR-VisualEfficacy-Jan2009.pdf) Alliance for Solid State Lighting. Volume 6, Issue 2: Outdoor Lighting: Visual Efficacy

Collections of links

- Light Pollution (https://dmoztools.net/Society/Issues/Environment/Light_Pollution) at DMOZ
- Interactive Map of City Lights at Academo.org (http://academo.org/demos/night-time-satellite-imagery/)
- Dark Skies Awareness (http://www.darkskiesawareness.org/) – An IYA2009 Cornerstone Project
- Light Pollution and the UK's changing skies (http://www.hillarys.co.uk/skyglow/)

- Computer Modelling using Walker's Law (http://www.cool.id.au/astronomy/Light_Pollution/Germany_2010_Walkers_Law_Model.jpg)
- BAA CfDS Yahoo discussion group (http://tech.groups.yahoo.com/group/cfds/)
- Dark Sky Importance gallery (http://www.twanight.org/newTWAN/gallery.asp?Gallery=Dark%20Skies%20Importance&page=1) at The World at Night (http://www.twanight.org/) (TWAN)
- Owen, David (August 20, 2007). "The Dark Side" (http://www.newyorker.com/reporting/2007/08/20/070820fa_fact_owen?currentPage=all). *The New Yorker*. Condé Nast Publications.
- Klinkenborg, Verlyn (November 2008). "Our Vanishing Night" (http://ngm.nationalgeographic.com/2008/11/light-pollution/klinkenborg-text.html). *National Geographic*. National Geographic Society.
- Dobrzynski, Judith H. (March 3, 2009). "Reclaiming the Night Sky" (http://www.judithdobrzynski.com/4677/reclaiming-the-night-sky). *The New Republic*.
- "Light Pollution" (http://www.assa.org.au/lightpollution). Adelaide, South Australia: Astronomical Society of South Australia.
- Turn Out the Lights! (http://harcourtscience.com/newsbreak/night_sky.html)
- The Alliance for Lighting Information (http://www.resodance.com/ali/home.html) (ALI) contains information about light, lighting, and related topics.
- Sample Lighting Ordinance
- The City Dark (http://www.thecitydark.com/) is a feature-length documentary on light pollution, directed by Ian Cheney, that was released in 2011.
- Crawford, Mark (5 October 2015). "LED light pollution: Can we save energy and save the night?" (http://spie.org/newsroom/technical-articles/1015-led-light-pollution?highlight=x2408&ArticleID=x115768). *SPIE Newsroom*.